

AUTOMOTIVE INDUSTRIES

VOLUME 59

Philadelphia, Saturday, July 28, 1928

NUMBER 4

Positions of Parts Companies Strengthened by Mergers

Overcapacity for production which has existed for some years in this branch of the industry is corrected to large extent by consolidation of interests.

By Norman G. Shidle

CORRECTION of the condition of overcapacity for production which has existed in the automotive parts and accessory field since about 1921 has been going forward continuously, chiefly in three ways:

1. Inefficiently operated units have gradually been forced into oblivion.
2. The market for replacement parts has been widened very materially every year by the increase in number of automobiles in use; the market for accessories has been widened during the same period by the inclusion of a great number of accessories as standard equipment and by the increased demand for these products in the secondary market as the general public has come to demand more and more accessories as a regular part of their cars.
3. A large number of mergers have been taking place during the last five years—a trend which has accelerated in the last 18 months—as the possibilities of decreased manufacturing costs and lower overhead expense became evident to various companies operating sometimes in competitive and sometimes in non-competitive fields.

The third factor has caused more general comment than either of the others because its operation involves more business drama and immediate news interest than either of the others. It constitutes a tendency which has been evident for some time back, but which recent events have emphasized strongly.

No very definite trend seems to have developed thus far as to whether

mergers of companies with generally non-competitive lines are to be more numerous than those of companies with competitive lines, or vice versa. Analysis of 37 important mergers in the parts, accessory or supply field since Jan. 1, 1927, for example, shows that 43 per cent involved companies which previously had been manufacturing competitive products, while 57 per cent were of organizations which prior to the consolidation had been making and selling non-competitive lines.

The purposes and possibilities of these two fairly distinct types of merger would seem to be different as regards certain fundamentals, although some common potentialities obviously exist. Where companies making non-competing types of products are consolidated, the chief basic advantages possible would seem to be those of reduced management and administrative cost, perhaps greater financial stability for the organization as a whole, and perhaps a more even sales curve in dollar volume through the varied seasonal or cyclical appeal of the various items in the broadened line.

Reduced direct selling costs often are hoped for as one result of mergers of this type, but too often ultimate experience has proved that hope to be a chimera.

Sometimes economies have accrued, but in a large number of instances no reductions in this particular item have been found feasible as a permanent proposition. And this experience is not strange, when the situation is analyzed closely.

Whether sold by five companies or by a single company, five different products have to be sold individually. The same functions of selling, ad-

TAKING into consideration only about 25 parts, accessory and supply company mergers involving the larger units, it is calculated that companies having total assets of \$270,000,000 have been involved in consolidations or mergers since Jan. 1, 1927.

If the assets of all of the smaller combines which have taken place here and there in the supply field were included as well, it is easy to believe that the total would run well over \$300,000,000.

vertising and distributing remain to be accomplished in connection with each of these products as before the merger. Overhead and administrative expense as applied to sales, of course, can be and usually is reduced as it is applied to the other departments of the business; but the actual, direct selling effort and expense offers little field for reduction because of the merger *per se*. Failure to recognize this fundamental, as a matter of fact, has meant temporary loss of sales success in some instances.

In the merger of these non-competitive lines, on the whole, major economies in administrative expense have accrued in a majority of instances, so that the ultimate result both from the standpoint of the merged companies and of their customers usually has been more than satisfactory. This type of merger, moreover, is not handicapped in any way by the possibility of important customers feeling that the combination was in any sense an attempt to gain monopoly of a supply source.

That the possibility of some such feeling exists in the case of mergers of strictly competitive lines cannot be doubted. In a few instances it has even resulted in important customers encouraging the establishment of further small independent supply sources. In most cases, however, it is fully recognized by customers and the general trade alike, that the mergers of competitive lines as well as those of non-competitive lines are based almost wholly on the idea of achieving fundamental economies which, in the end, will redound to the benefit of the purchaser as well as of the supplier.

It has been in the merging of competitive lines, of course, that most has been accomplished toward balancing of supply and demand in the particular field. While every aspect of a new merger takes months and sometimes years to become completely adjusted, it is unquestionably true that elimination of excess plant capacity, and thus of an excess overhead burden, has frequently been a final result of consolidation of companies making competitive products."

Little Saving in Selling Expense

Superficial consideration might lead to the belief that the competitive merger would have not only the advantages of reduction of overhead and production costs which come through the non-competitive merger, but also the possibility of reducing sales expense by the consolidation of competing lines. Some possibilities along this line exist without question, yet the economies which accrue from this particular element often have turned out to be less than some have anticipated. While advertising and selling a single line instead of two or three permits some reduction in direct sales expense, again experience shows that most of the same functions have to be performed in selling to almost the same degree as previously.

A combined line of products selling through the replacement market, for example, will need just as many wholesale and retail outlets as did the two or three separate lines prior to the merger if total volume is to be maintained. In some instances, of course, these distribution units will have been duplicated, but it most instances only a small proportion of outlets are in this

category. With fewer but more powerful manufacturing units competing for the favor and facilities of these retail and wholesale outlets, the necessity for increased rather than decreased merchandising effort has become apparent in more than one instance. It is true, on the other hand, that competition between efficient, well-managed concerns is more economical in every case than the unintelligent competition of firms lacking in business experience and knowledge of costs.

Important Economies

There can be little question, however, that the scores of mergers of both types which have taken place in recent months have brought about important economies on the whole, and the most of them will bring about still further advantages both for stockholders and customers as final adjustments are made and ultimate coordination of facilities and personnel is effected.

In some cases, recent mergers have consisted of the combination of companies of fairly equal size, in others of the acquisition of smaller organizations by larger ones seeking to broaden their field of activity, increase their distribution outlets or reduce the cost of their factory operations. Frequently, the recent mergers have involved organizations which were already the product of previous combinations or consolidations.

Among the larger and more important of the non-competitive mergers in the automotive supply field since Jan. 1, 1927, that of American Chain Co., Inc., and Manley Mfg. Co., stands out. The American Chain Co., Inc.,

on June 13, 1927, acquired, for more than \$1,000,000, a controlling interest in Manley Mfg. Co., which together with the subsidiaries already in the American Chain Co. fold, resulted in a corporation whose total assets were nearly \$36,000,000 on Jan. 1, 1928. The history of the American Chain Co., as a matter of fact, has been one of constant progress and growth through the acquirement of additional properties ever since its incorporation in New York in December, 1912. It purchased the assets of the chain business of the Oneida Community, Ltd., and in 1913 erected a factory at Bridgeport and began making chains for Weed chain grips. In 1915, it acquired by purchase the Weed Chain Tire Grip Co. and in 1916 bought the business of A. C. Campbell, Inc., of Waterbury, and Standard Chain Co. Continued growth of similar character resulted in the present development of the company which now has the following subsidiaries: American Cable Co.; Andrew C. Campbell, Inc.; Manley Manufacturing Co.; Highland Iron and Steel Co.; Page Steel & Wire Co.; Reading Steel Casting Co.; Dominion Chain Co., Ltd.; British Wire Products, Ltd., and Parsons Non-Skid, Ltd.

Murray Corp. acquisition of Jenks & Muir Mfg. Co. in June, 1927, was another combination of non-competitive companies into an organization which already was the result of previous consolidations. Murray Corp. in 1925 took over the Murray Body Corp. which had been incorporated in Michigan in 1924 to take over the assets of C. R. Wilson Body Co., Towson Body Co., and J. C. Widman & Co. The addition of Jenks & Muir, one of the largest manufacturers of springs and upholstery materials, brought the total assets of the Murray Corp. to something over \$20,000,000 at the end of 1927.

Important also among recent mergers of companies with products for the most part non-competitive, was the bringing together of Borg & Beck Co., Warner Gear Co., Marvel Carburetor Co., Wheeler-Schebler Carburetor Co., and Mechanics Machine Co. into the \$15,000,000 Borg-Warner Corp. The Borg & Beck Co., it is interesting to note, had previously acquired on July 31, 1924, all of the capital stock of A. C. Norton, Inc., while it controlled also the Standard Unit Parts Corp. and the Automotive Parts Corp.

Eaton Axle Expansion

Other outstanding combinations of similar character during the last 18 months include the acquirement of the Easy-on Cap Co. by Eaton Axle Co. (the latter a result of several previous consolidations); the formation of Splitdorf-Bethlehem Electrical Co. into a \$6,000,000 corporation by combination of Splitdorf Electrical Co. and the Bethlehem Spark Plug Co.; the consolidation of Unit Corp., Obenberger Forge Co., Dallman Machine Co., Universal Power Shovel Co., and Fuller & Sons into a unit with assets of \$4,515,588; the purchase by McQuay-Norris Mfg. Co. of King Quality Products, Inc., with resulting total assets of \$2,733,004; that of Safe-T-Stat and Nagel Electric with assets of \$2,372,160; of Kingston Products, Kokomo Brass, Kingston and Kokomo Electric with assets of \$1,542,473; of Breeze Corp. and Mays Equipment Co. with assets of \$1,808,680, and of Chisholm-Moore and Columbus McKinnon Chain Co. with assets of nearly \$5,000,000.

In many of these latter cases, as in those previously mentioned, the recent consolidation or acquisition of new properties was merely an added link in a chain of combination begun in one way or another a number of years ago.

And in the group of mergers of firms making competitive types of product, about the same characteristics as to size and past history are manifest as in those making non-competitive lines. Equally large and equally small have been the recent manifestations of the tendency toward further combinations in both groups. In the competitive group, for example, one of the largest of the recent mergers was the purchase of a substantial interest by the Briggs Mfg. Co. in LeBaron, Inc., resulting in a unit whose total assets at the end of last year were \$32,856,206. Here again is found a history which includes numerous purchases and building up through combinations. Briggs began, as a matter of fact, by purchasing the assets of the Sterling Auto Top Co. and the Detroit Curled Hair Works, subsequently dissolving both companies. In 1924 it completed its acquisition of the Michigan Stamping Co. and in 1925 bought the Waterloo plant of the Timken Axle Co., the Meldrum Ave. plant of the American Auto Trimming Co. and the tool and die plants of the F. J. Lamb and Blodgett Tool & Engineering Co.

The consolidation of the properties of the Kelsey Wheel Co. and the Hayes Wheel Co. in May, 1927, was another competitive merger of prominence, the assets of this combination being \$22,799,531 at the end of 1927. The opportunities for reduced overhead in combinations of this kind are illustrated by the fact that

during 1927 the Kelsey-Hayes Wheel Corp. dissolved the Kelsey-Hayes Co., Albion Bolt Co., Morrison Metal Stamping Co. and Tennessee Hickory Products Co., the major portion of the plants formerly operated by these companies having been closed up or sold. These companies were among subsidiaries which had been acquired several years previous by the Hayes Wheel Co.

The merging of Electric Auto-Lite and U. S. Battery Corp. into a \$19,538,475 corporation on May 25, 1928, was another example of the bringing together of manufacturers of relatively competitive lines and of the establishment of a new combination on the foundation of several previous ones. Electric Auto-Lite had been incorporated in May, 1922, to take over the business of the Electric Auto-Lite division of the Willys Corp. It owned the DeJon Electric Corp. and the Enamored Wire Co. and in 1926 had acquired the American Bosch Magneto Corp. and Gray & Davis, Inc. U. S. Battery Corp. was also the result of a previous merger, that of the U. S. Light and Heat Corp. and the Automotive Battery Co. Previous to the formation of U. S. Battery Co., in May, 1927, the U. S. Light & Heat Corp. had consolidated in 1915 the Bliss Electric Car Lighting Co., National Storage Battery Co. and U. S. Lighting & Heating Corp. The Automotive Battery Corp. was incorporated in 1927 to own practically all of the stock of an operating concern of the same name. C. O. Miniger, president of the merged organization, is also chairman of the board of the Logangear Co.

In the field of competitive mergers, too, comes the acquisition this year by Biflex Products Corp. of L. P. Halladay, making a bumper concern with assets of nearly \$2,500,000; also in this category was the purchase of National Gage & Equipment Co. by Moto Meter Co. in the latter part of 1926, making a \$4,000,000 company. Other important recent mergers of companies making competitive products which come to mind include the working arrangements between Spicer Mfg. Co. and Dana Mfg. Co., whereby Spicer occupies the plant of the latter company for the purpose of manufacturing; the acquirement by Pines Winterfront Co. of a controlling interest in Detroit Motor Appliance Co., and the merger of Diamond Motor Parts Co., Gill Mfg. Co. and Schlieder Mfg. Co., although the products of this latter company were not competitive with those of the other two units.

The changes which have been taking place recently and which are occurring at present would seem to be for the most part an orderly, intelligent and effective readjustment of facilities and business potentialities which, as time goes on, will mean greater stability for the automotive supply industry, better service for the vehicle manufacturers, improved merchandising possibilities for wholesalers and retailers and greater dollar-for-dollar value in automotive products for the public. This is the broad background which rears itself behind any study of the merger situation in the automotive parts and accessory industry as a whole, even when temporary difficulties are fully recognized and the absolute necessity is understood for time and management ability in ironing out the internal business frictions which almost inevitably accrue immediately following a good many consolidations.

"Silver Anniversary" Buick Engines are Larger

Changes made throughout chassis of all models and bodies have been entirely redesigned with new radiator and hood lines.

BUICK production for 1929 will cover three "Silver Anniversary" chassis models, of which the two larger ones differ essentially only in respect to length of wheelbase. Engine sizes of all models have been increased, and the resulting gain in power has led to dimensional and other changes in many of the other parts. In fact, every major chassis component with the single exception of the brakes has been affected. Various changes have been made also to improve riding qualities and to provide greater safeguards against trouble in service.

In the bodies, radical departures have been made from conventional "modern" design, with the elimination of all belt moldings and the introduction of a new form of body panel designed to catch high lights in long horizontal lines, to add to the impression of increased length. The design of the body panels, moreover, lends itself well to large variations of color schemes, using only a few fundamental background colors offset by contrasting colors in small panels below

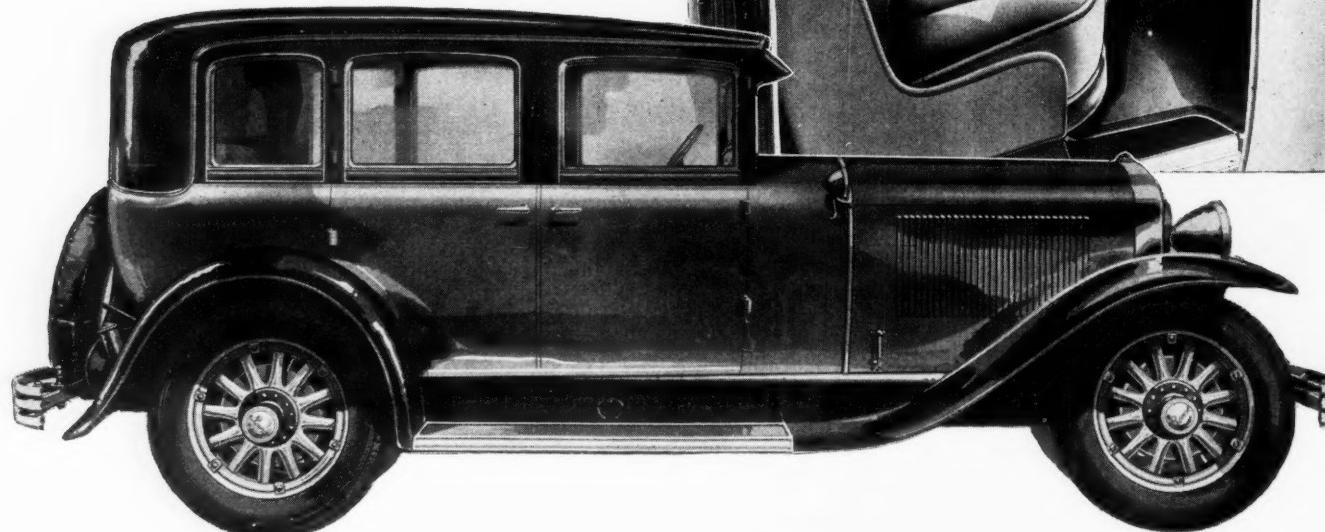
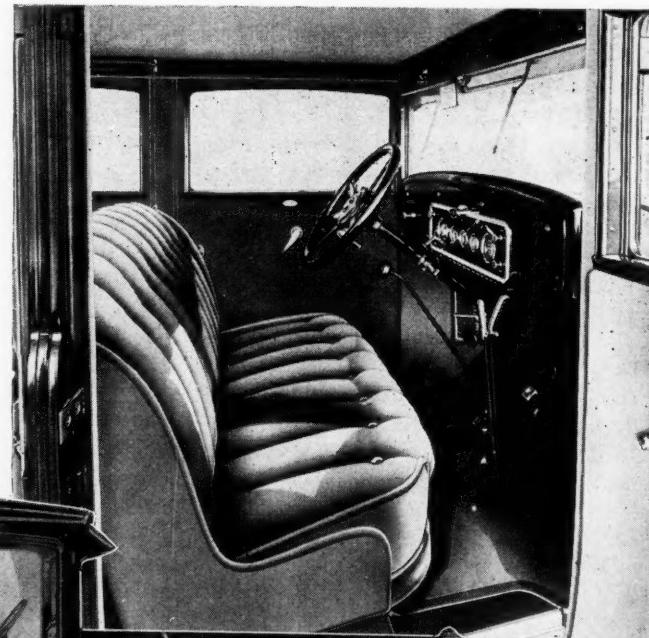
the windows, pin striping around the window reveals, etc.

An important development, which was foreshadowed to a certain extent in last year's models, is a greater degree of uniformity of chassis and body design in all three series. Although interchangeability of parts between the three series has not been increased to any marked extent, the designs are practically identical except for dimensions. A number of the changes made, such as those in the type of rear axle gear assembly and in the axle shaft splining of the 121 and 129, were made solely because of a desire for uniformity.

Taking the chassis individually, the "Master 116" (formerly the Standard Six 115) has had its cylinder dimensions increased from $3\frac{1}{4}$ by $4\frac{1}{2}$ in. to $3\frac{5}{16}$ by $4\frac{5}{8}$ in., which increased the piston displacement from 207 to 239 cu. in.; the maximum torque from 146 to 172 lb.-ft., and the maximum horsepower from 63 to 74

Right—Driving compartment of Silver Anniversary Buick, showing new instrument board and tandem-blade windshield cleaner

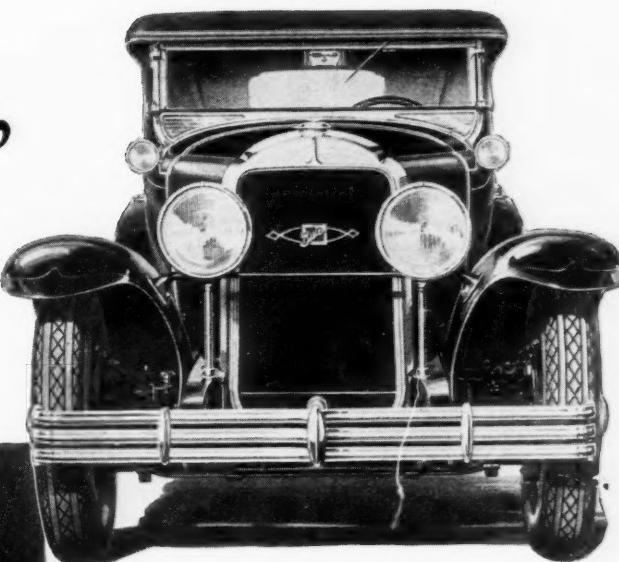
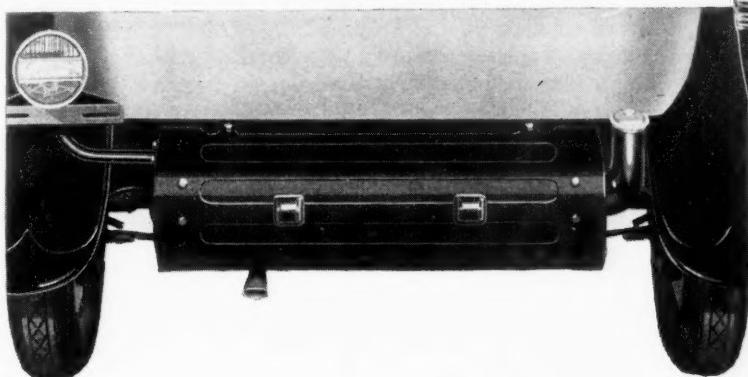
Below—Buick Silver Anniversary five-passenger four-door sedan



in New Dress,

BUICK PRICES: New Buick prices, slightly higher in most cases than for corresponding models in the previous line, are listed on page 115.

By
A. F. Denham



Above—Front view of Silver Anniversary Buick (open model)

Left—Rear view of new Buick, showing how fuel tank and openings between tank and fenders are covered

(at 2800 r.p.m.). In spite of the fact that the compression ratio has been slightly lowered (4.56 as compared with 4.60) the brake mean effective pressure has been raised from 107 to 109 lb. p. sq. in., which is no doubt the result of the use of relatively larger valves. Valve clear diameters have been increased from 1 7/16 to 1 9/16 in. and the lift from 0.322 to 0.337 in. Other factors that have favorably influenced the b.m.e.p. are the rounding off of the corners of the inlet manifold and the adoption of the new Marvel three-jet carburetor. The latter has two high-speed jets and its venturi is of 1 5/16 in. instead of 1 1/4 in. diameter. Two stops are provided on the idling jet adjustment to make this adjustment more fool-proof.

Engine Parts are Larger

The increased power is reflected by increases in the dimensions of many engine parts. The crankshaft main bearing diameters, for instance, have been increased from 2 1/4 to 2 3/8 in. Steel-backed babbitt-lined interchangeable main bearings and caps are now used. The crank pin diameter has been increased from 2 to 2 1/8 in., and the piston pin diameter from 3/4 to 7/8 in. An interesting safety feature in the rods is the drilling of a hole just below the bottom end of the piston-pin slit, to relieve the strains set up in this part of the rod by clamping the pin.

Semi-steel pistons are continued, the length being in-

creased 1/4 in. A 3/16 in. two-slot oil ring replaces the 1/8 single slot type used last year. The cams have a new quieting ramp and the dimensions of the camshaft bearings have been increased, these being now as follows:

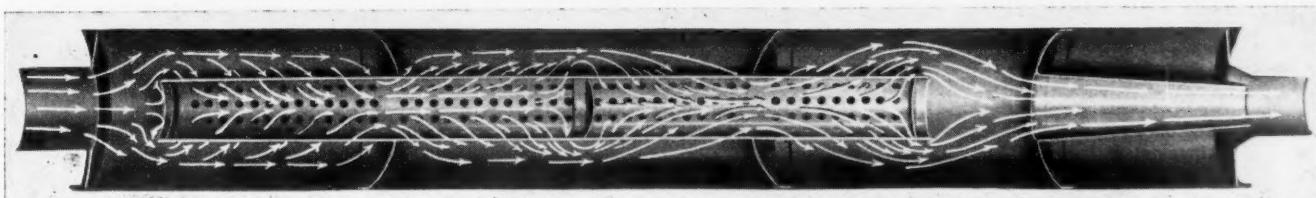
Front 2 1/16 x 1 9/16 Third 1 15/16 x 1
Second 2 1/32 x 1 3/8 Rear 1 25/32 x 1 3/32

A separate eccentric is provided on the camshaft for driving the AC fuel pump, now used. This pump is located on the opposite side of the engine from the cam-shaft and is driven from it through a rod similar to a valve pushrod. Rocker arms now have steel-backed babbitt-lined bushings which ride on the hardened and ground rocker arm shaft. A change in valve spring material has permitted reducing the spring pressure, in spite of the increased lift, from 53-65 lb. to 44-56 lb.

The volumetric efficiency has been favorably affected by opening the exhaust valve slightly later and closing the inlet valve earlier. Inlet valve opening, which formerly occurred at dead center, now occurs 10 deg. 24 min. earlier, while exhaust valve closing occurs at 32 deg. 12 min. after top dead center, 7 deg. later than formerly.

A drilled concentric tube type of muffler replaces the baffled type formerly used. The heater valve in the exhaust manifold now uses a Cyclops steel shaft and Duro steel butterfly.

The oil capacity has been increased to 7 1/2 qt. and



Sectional view of new Buick muffler, showing how exhaust gases pass through various compartments

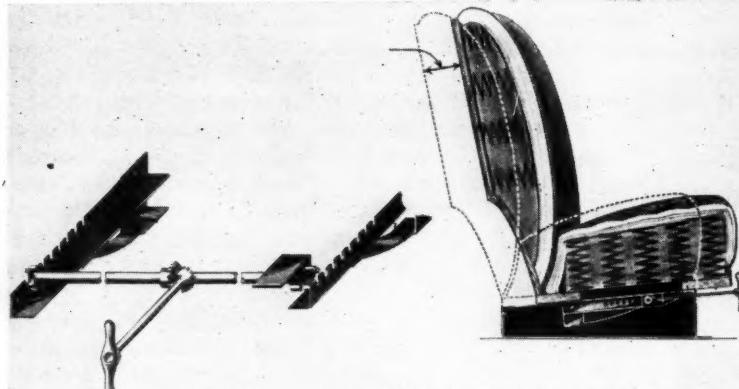
the oil pump gears also are larger. Brass forgings are now used between the bearings and the oil header to reduce the chance of breakage. An oil deflector riveted to the cover of the timing case directs the lubricant onto the timing gears. Improvement of the engine covers also is traceable to the lubrication system. Baffles in the valve covers and heavier gaskets tend to prevent leakage.

Use of a more efficient irregular-hexagon-type of radiator core has permitted reducing the width of the radiator. Capacity of the entire cooling system is increased 1 qt., to 4½ gal. A false bottom, resembling the hexagon core structure, covers the bottom tank and conveys an impression of increased depth. A new type of filler cap has been developed, of the easy-on type, and oval in shape. The flat fan belt has been replaced by a 5/8 in. V-belt as used on the larger Buick models. In the engine front mounting a soft rubber bushing has been substituted for the bushing of woven material used last year.

Metric Spark Plugs

Changes in the electrical system include the adoption of metric spark plugs, an increase in battery capacity from 90 to 100 amp.-hr., adoption of an improved coil, located on the timing gear housing instead of on the generator, the adoption of a new type of generator coupling using two Woodruff keys, and better ignition cables, shellacked and provided with rubber caps at the distributor. The number of teeth in the flywheel has been increased from 118 to 123.

To soften the clutch action the clutch plates now are given a slight wave. The plates, moreover, are piloted directly in the flywheel for better rotating balance. The



New adjustable front seat and the operating mechanism

transmission housing is piloted into the bell housing and the pinion mounting for the speedometer drive has been improved to quiet this drive.

Universal joints and propeller shaft tubes have been slightly enlarged in capacity. Numerous changes have been made in the rear axle. In the first place the tread has been increased from 56 to 58 in. Axle shafts, which are of the 10-spline type, are now 1 5/16 in. in diameter. Differential gears and pinions are now of 3 1/2 per cent nickel steel, and the differential pins of 1 1/2 per cent nickel steel and chromium plated. The new rear axle ratios are 49 to 10, 49 to 11 and 51 to 11. Torque tube drive is continued, but a better connection of the brace rods to the torque tube is obtained by making the attaching bracket completely cylindrical instead of semi-cylindrical. A sheet metal oil deflector riveted to the differential cover directs the lubricant onto the gears and

bearings as it is thrown out by centrifugal force.

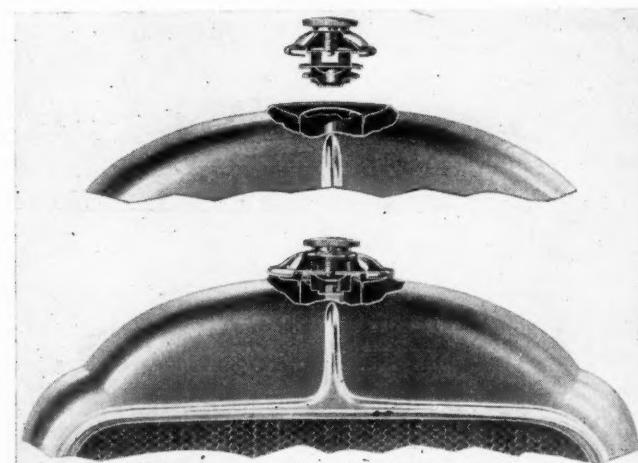
Front axle spindles and bearings have been suitably enlarged. Sheet brass bushings are now fitted between the axle tube and the spring seat to eliminate galling.

The frame channel is now 1/32 in. deeper and stock thickness has been increased from 9/64 to 5/32 in. In addition to turning down the lower frame channel flange, the same as last year, the upper flange is now turned up for some distance fore and aft of the front kick-up. Numerous changes in bracket design have been made. For instance, the rear spring bracket is now drop-forged and is designed to take the twisting strains more directly by making the rear body bracket integral with it.

Owing to the greater depth of the radiator it was necessary to work out a new mounting, the radiator now being dropped down onto the frame instead of assembled from the front. A steel plate inserted between the shell and the core is welded to the latter and is provided with two slotted and drilled holes at the bottom, which permit the insertion of the heads of the vertical mounting bolts into the assembled radiator unit. The slots also make possible better alignment of the radiator. The cover for the starting crank hole is also of new design, it is cylindrical in shape, and extends through the core, a coil spring with felt disk attached keeping out dirt.

Tires on the 116 are 30 x 5.50, as compared with 31 x 5.25 on last year's model. It is stated that the top speed of the 116 models is 70 m.p.h. or better. A hill-climbing test was made on a 1400-ft. grade of 11.6 per cent. Starting from a standstill the speed at the top was 22 m.p.h. with the 116, as compared with 8 m.p.h. with a similar 1928 model.

Practically all of the developmental changes found on the 116 have been incorporated also in the 121 and 129. As in former years these two chassis are practically identical, except for wheelbases. In these models the engine power has been increased from 78 to 91 hp. at 2800 r.p.m. and the maximum torque from 187 to 215 lb.-ft. Cylinder dimensions are now 3 5/8 by 5 in. as compared with 3 1/2 by 4 3/4 in., thus increasing the piston displacement from 274 to 309.6 cu. in. The brake mean effective pressure has been raised from 103 to 105 lb. per sq. in. by increasing the compression ratio from 4.2 to 4.37 to 1. Valve sizes remain the same but lift has been increased from .322 to .337 in. The new Marvel three-jet type carburetor is of 1 9/16 in. in



Radiator cap construction and operation

outlet diameter, $1\frac{1}{16}$ in. larger than that used previously. Exhaust ports are $\frac{1}{8}$ in. larger and the exhaust pipe has been increased from $2\frac{1}{4}$ to $2\frac{1}{2}$ in. in diameter.

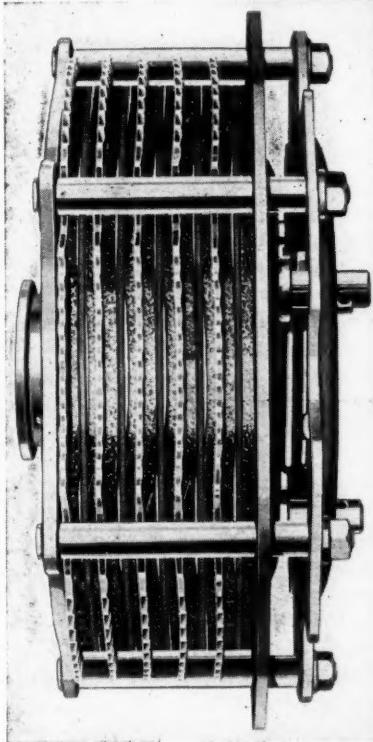
The crankshaft is heavier than formerly, with main bearing and crank pin diameters increased respectively from $2\frac{3}{8}$ to $2\frac{1}{2}$ in. and from $2\frac{1}{4}$ to $2\frac{3}{8}$ in. Thicker crank cheeks have resulted in a $\frac{1}{2}$ in. decrease of the total main bearing length, the individual lengths being $2\frac{7}{16}$ for the front, $1\frac{13}{16}$ for the second, $1\frac{1}{8}$ for the third, and $2\frac{23}{32}$ in. for the rear main bearing. Steel-backed "Aero-Main" main bearings shells are found in this model also.

Some chromium has been added to the inlet valve head material and the stem bearing surface has been lengthened in proportion to the increased valve lift.

Spring pressure has been reduced, the pressure limits with the valve closed now being 44 and 56 lb. The width of the cam gear has been increased from $1\frac{1}{4}$ to $1\frac{3}{8}$ in., and that of the silent gear from $1\frac{7}{32}$ to $1\frac{9}{32}$ in.

Connecting rod length has been increased from $10\frac{61}{64}$ to $11\frac{1}{4}$ in. and the piston has been lengthened $\frac{1}{4}$ in. Piston pins are $1\frac{5}{16}$ in. in diameter, being $1\frac{1}{16}$ in. larger, and semi-steel pistons are continued.

Changes in the valve timing are in the opposite direction to those in the 116 engine. Inlet closing and inlet opening both occur later than formerly, the latter at 12 deg. 30 min. after top dead center. Exhaust closing is also somewhat later, while the exhaust



Buick clutch assembly. Irregularities in the surface of the facing (purposely exaggerated in the photograph) are used to insure smooth engagement.

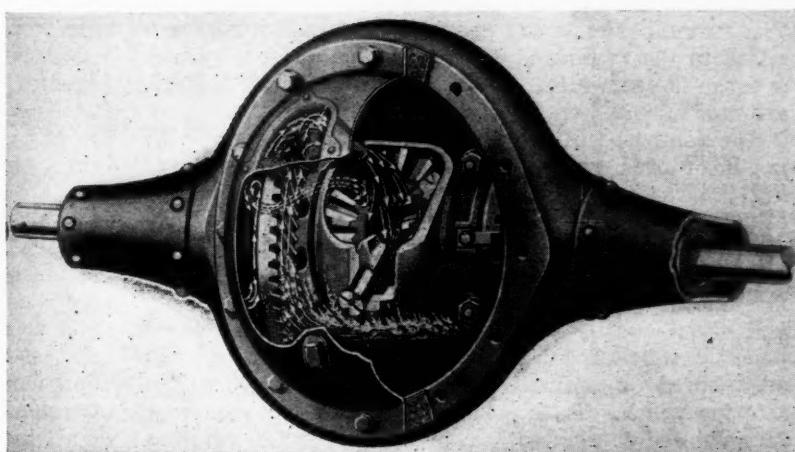
opening remains virtually unchanged at 62 deg. 30 min. The compression pressure is increased from $80\frac{1}{2}$ to 82 lb. per sq. in.

Changes in the valve mechanism are similar to those in the 116. The camshaft bearings are larger and have the following dimensions:

Front, $2\frac{1}{16}$ by $1\frac{15}{16}$ Third, $1\frac{15}{16}$ by $1\frac{1}{2}$
Second, $2\frac{1}{32}$ by $1\frac{1}{2}$ Rear, $1\frac{25}{32}$ by $1\frac{1}{16}$

The total oil capacity has been increased from 8 to 9 qt. Radiator cores have the same frontal area on all chassis, and are somewhat smaller than last year. The cooling system capacity of the larger series is 5 $\frac{5}{8}$ gal., which represents a $2\frac{1}{2}$ qt. increase.

Electrical changes are the same as on the 116. The battery capacity is larger, 120 instead of 105 amp.-hr., and the starter reduction is slightly higher.



Rear axle differential gear lubrication. Oil carried up by differential ring gear is deflected by baffle inside housing directly into differential gears

The rear axle used on the larger series has been made uniform with that on the 116, which involved an increase in tread from 56 to 58 in., the adoption of Hyatt roller bearings at the wheels, and an increase in the number of splines on the axle shafts from 6 to 10. The diameter of the axle shafts was increased from $1\frac{3}{8}$ to $1\frac{15}{32}$ in. in view of the higher engine power, and a lower rear axle reduction is used. The reductions, which vary with the type of body, are 53 to 13, 49 to 11 and 51 to 11.

Axle I-Beams Heavier

In addition to the increase in size of the front wheel bearings, which are of New Departure manufacture, and of the spindle arm diameter, the front axle I-beams also have been made heavier, the depth having been increased from $2\frac{1}{4}$ to $2\frac{5}{16}$ in. and the width from $1\frac{7}{8}$ to $2\frac{1}{16}$ in.

Changes in the steering gear, in the rear axle spring bushing mounting and in the frame are identical with those found in the smaller model, but in addition the rear offset in the frame of last year's larger models

Buick Silver Anniversary Prices

Series 116

	New Price	Old Price
5-p. 2-door sedan	\$1,220	\$1,195
5-p. phaeton	1,225	Same
2-p. business coupe	1,195	Same
4-p. 4-door sedan	1,320	1,295

Series 121

4-p. sport roadster*	1,325	....
3-p. business coupe*	1,395	....
4-p. special coupe	1,450	1,465
5-p. close-coupled sedan*	1,450	....
5-p. 4-door sedan	1,520	1,495

Series 129

5-p. phaeton	1,525	Same
7-p. touring*	1,550	....
5-p. coupe	1,865	1,850
5-p. close-coupled sedan*	1,875	....
4-p. convertible coupe*	1,875	....
5-p. 4-door sedan	1,935	1,925
7-p. sedan	2,045	1,995
7-p. limousine*	2,145	....

*New Model.

has been eliminated and a straight frame substituted. The frame channels are heavier, 1/16 in. having been added to the depth and 1/32 in. to the stock thickness and the flange width. The tires, which are 32 x 6.50, are now mounted on 20-in. rims (21 in. last year).

The top speed of the larger models is said to be 75 m.p.h. or over, and on the 1400-ft., 11.6 per cent test hill the various closed body models will reach speeds of 23 and 26 m.p.h. at the top, as against 10 to 15 for the 1928 series.

Eighteen different body types are offered, including five on the 115 $\frac{3}{4}$ -in. wheelbase, six on the 120 $\frac{3}{4}$ -in. and seven on the 128 $\frac{3}{4}$ -in. wheelbase chassis. Body panels are belled out below the waist line, which not only provides a distinctive appearance but increases the interior width. Belt moldings from the rear quarter forward are eliminated, except that there are molding panels below the door windows, these being stamped into the body sheets and finished in contrasting colors. A molding is still used around the back and across the rear quarters, running upward to blend into the drip molding. The entire effect is that of well rounded curves, enhanced by the arched window frames, deeper roof side panels and wider and more sweeping fenders. A sharp break at the front of the roof for the cadet-type sun visor offers a contrast.

Front cross seats in the four-door models are not bolted to the side pillars; the seat backs and cushion frames are of integral construction, and the seat has a range of adjustment of 3 $\frac{1}{2}$ in., the adjusting mechanism being shown in an accompanying illustration.

A spring-loaded bolt is used for the front body mountings near the dash, to provide some flexibility at this point. Door locks are pinned into the door handles as a protection against theft, as the pins will shear off when the locked door handle is twisted, without affecting the operation of the lock itself. To the bottom of each window glass is attached a slotted plate in which rides the arm from the crank type window lift, this change having been made to prevent binding and cocking of the windows.

Interior Finish Improved

Interior finish has been considerably improved. Rear seats are 2 in. wider and front compartments are fitted with cowl ventilators at the sides, foot-operated. Wood garnish moldings in walnut finish are used on all the closed models. Instruments are individually mounted but grouped in the center of the instrument board and surrounded by a nickeled molding. Instruments include a 90-mile speedometer, an engine thermometer, and King-Seeley hydrostatic fuel gage. A three-way toggle type switch is provided for instrument board lighting, furnishing both direct and indirect illumination, as desired. Seat padding is heavier than formerly. Open models have genuine leather upholstery and forward-folding windshields. On the two-passenger models, bellows are provided in the upholstery back of the seat-back to allow for the adjustability of the seats. Rumble seat coupes are fitted with crank operated windows in the rear. Closed models have metal rear quarters.

The new Buick models are fitted with a distinctive type radiator having a fairly deep, chromium-plated shell at the top, the name plate now being mounted at the center of the core in a decorative plated panel. Headlights are large in diameter and are mounted on individual stanchions. They are cone-shaped, as are the cowl lamps, the latter being supported by cowl bands. All exterior hardware is chromium-plated. On the 121 and 129 series this includes the lamps and stanchions, which are finished in enamel on the smaller

model. A sheet metal cover over the gas tank at the rear improves the general appearance.

Standard equipment includes a new double windshield wiper of the tandem-blade type, of Delco-Remy manufacture. To prevent unnecessary use of current when the car is not in operation this wiper is wired to the ignition switch. Lovejoy hydraulic shock absorbers are standard on all models. Included in the tool equipment is a strap wrench for removing the new type large round hub caps. In addition, the standard equipment includes a new type of oil filter of the non-rechargeable type, a combination tail, stop and backing light mounted on a separate bracket from the frame, smoking and vanity sets on all closed models, pneumatic windshield wipers on open models, and trunk racks on the 129 brougham and standard sedan. An addition is found in a five-passenger sedan on the 129 chassis which is practically the seven-passenger sedan with the auxiliary seats removed. Twelve-spoked wood wheels are standard, but demountable wood, wire or disk wheels are available at extra cost, which includes a fender well for the spare wheel.

Accidents in Great Britain

AN analysis of the causes of accidents on the roads of Great Britain in which motor vehicles were involved was made in an address delivered at the annual conference of the Institution of Municipal and County Engineers held in London recently, by Sir Henry Maybury, Director-General of Roads, Ministry of Transport.

In the road traffic area lying within 25 miles of Charing Cross, Sir Henry said, 287 accidents in which there had been any question of defect in the vehicles or in the condition of the road, had been inquired into. It was found that in 99 of these cases, involving 9 deaths and 41 cases of injury, mechanical defects had been the cause. Road conditions were responsible for 159 accidents, involving 50 deaths and 64 cases of injury. The chief causes of the accidents and their numbers had been: Bad road surfaces, 80; faulty steering gear, 42; bad reinstatement, 28; skidding, 18; faulty brakes or back axle failures, 10. Outside the London traffic area the number of people killed on the highways of Great Britain in 1927 had been 488, while 1161 had been injured. The causes and the respective numbers of killed and injured in those accidents had been: Negligent driving, 160 killed and 346 injured; bad judgment, 108 and 232; road conditions, 64 and 188; mechanical defects, 51 and 292; other causes, 105 and 103. Analyzing the accidents attributable to road conditions, he said that skidding had accounted for 30 deaths and 134 cases of injury; bad road surfaces for 6 and 7; dangerous corners for 13 and 20; inefficient signposting for 7 and 3, and railway level crossings for 6 killed and 23 injured.

Index to Volume 58

INDEX to Volume 58 of *Automotive Industries*, from January to June, 1928, inclusive, is now ready for distribution. Copies will be sent to all subscribers who have had their names on mailing lists for previous indexes. Other subscribers may have a copy on request.

Reducing Gears and Superchargers, Paris Air Show Features

Trend toward air-cooled engines also continues with many European makers introducing new designs. Wright "Whirlwind" to be built by Hispano-Suiza.

By W. F. Bradley

REALLY international for the first time, the French aeronautical exhibition, held this month in the Grand Palais, Paris, unites 36 makers of planes, 14 engine manufacturers, and a total of 207 exhibitors in all classes.

Of the 36 airplane makers 15 are foreign and 21 French, and of the 14 engine makers 5 are foreign. The participation of Central European nations is strong, and a feature of the exhibition is the number of visitors from such countries as Germany, Austria, Czechoslovakia, Hungary, Poland and Russia.

American engine and plane makers are not strongly represented, although the Fairchild Aviation Corp. has a stand and the Aeronautical Chamber of Commerce has a booth which constitutes a meeting place for the many American aircraft experts at present in Paris.

Outstanding features in the engine section of the show appear to be the use of reducing gears, which enable engine speeds to be increased; supercharged engines, and an increased number of air-cooled models. Firms which up to the past have confined themselves to water-cooled types this year have added an air-cooled model, generally of the radial type. Examples are Renault who, since he dropped his eight-cylinder V-type engine some 12 years ago, has devoted attention exclusively to water-cooled types. This year he shows for the first time a radial nine-cylinder air-cooled engine of 250 hp. having two valves in the head, with pushrod operation. The rocker shafts on the heads of the cylinders are inclosed; they are lubricated by a Tecalemit greaser and can be examined by removing a quick-detachable sheet-steel cover plate. The two magnetos are mounted in front of the

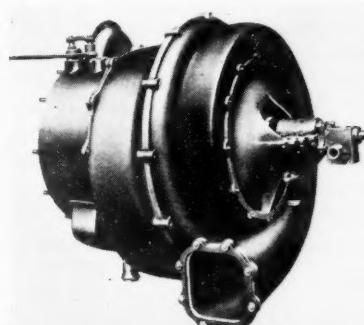
engine, just behind the propeller, while the triple carburetors are at the rear, with the gas passages going through the aluminum crankcase, and with external sheet-metal leads to the inlet valve ports.

Another important recruit to the air-cooled field is Hispano-Suiza, who, while continuing the water-cooled models, has taken out a license for the construction of the Wright "Whirlwind" engine, one of which is on exhibition.

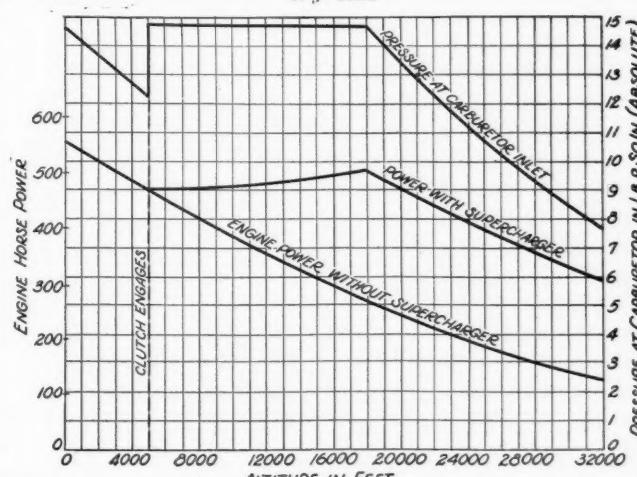
Isotta-Fraschini is showing for the first time a 12-cylinder V-type air-cooled engine of 450-500 hp., running with a direct propeller at 2200 to 2500 r.p.m. and stated to weigh only 682 lb. The steel cylinders have no cowling or fan to assure a draft of air, and are mounted very close together on an aluminum base-chamber. The four valves per cylinder are operated by an overhead camshaft contained in an aluminum housing, which also serves as intake gas passage. There are four carburetors, two on each side, and the exhaust is also on the outside of the engine.

Lorraine-Dietrich, another water-cooled specialist, is now producing three air-cooled models: a five-cylinder of 110 hp., a seven-cylinder of 230 hp., and a 14-cylinder having a bore and stroke of 135 by 150 mm. All these are of the radial type. The cylinders are in steel, with aluminum alloy heads having screwed-in valve seats. There are two valves per cylinder, operated by push-rods and rockers, these latter being mounted on roller bearings.

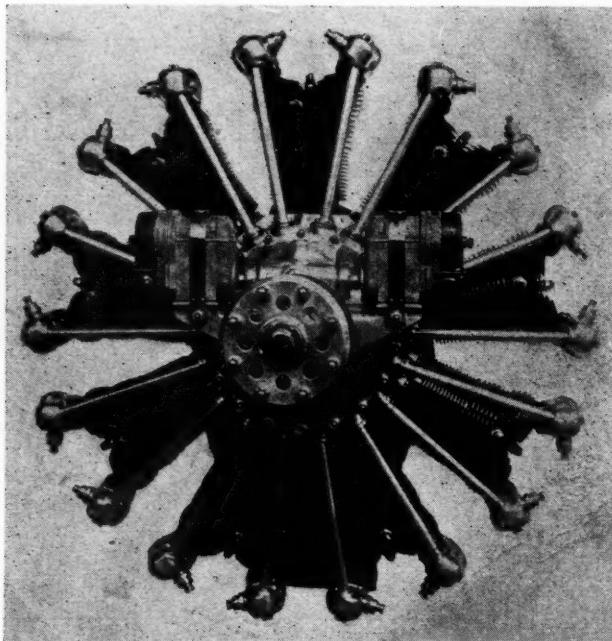
There is a marked extension in the use of reducing gears, the type most generally employed being the Waseige-Farman planetary system which, in addition to being used on the Farman engines, is found on His-



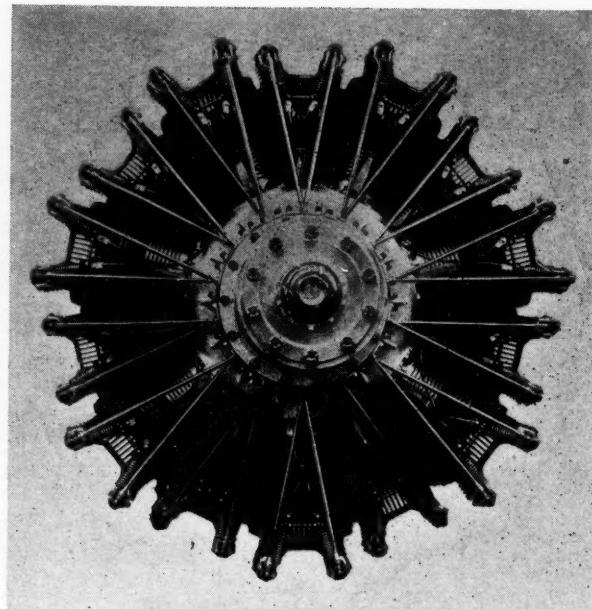
Rateau engine-driven compressor, seen from delivery side



Horsepower curves of Farman engine with and without Rateau compressor



Renault nine-cylinder air-cooled radial engine



Lorraine-Dietrich 16-cylinder air-cooled radial engine

pano-Suiza, Lorraine-Dietrich, B.M.W., Jupiter, Gnome & Rhone, and other engines. With reduction ratios of 2 to 2.2 the natural tendency is to increase the number of revolutions, and the opinion of many European engineers is that for power outputs of 500, with 12 or 24 cylinders, aircraft engines will run at 3000 r.p.m. One of the most outstanding engines of this types is the new Farman 600-700 hp. 18-cylinder inverted, with cylinders in Alpax metal, now shown not only with a geared down propeller but with a Rateau mechanical supercharger. This engine runs at 2800 r.p.m. and weighs 700 lb.

Several engines are on exhibition with the Rateau mechanical supercharger, which appears to have been developed by this firm in conjunction with the Farman company. Rateau produced a turbo-compressor, making use of the exhaust gases, in 1917, its first application being on an engine of 175 hp. and later to 300 and 450 hp. engines, on which it maintained the ground pressure up to altitudes of about 17,700 ft. The mechanical compressor now introduced maintains atmospheric pressure in the intake pipes up to altitudes of 18,000 ft. Two models have been produced up to the present, for engines of 450-550 and 600-750 hp., respectively.

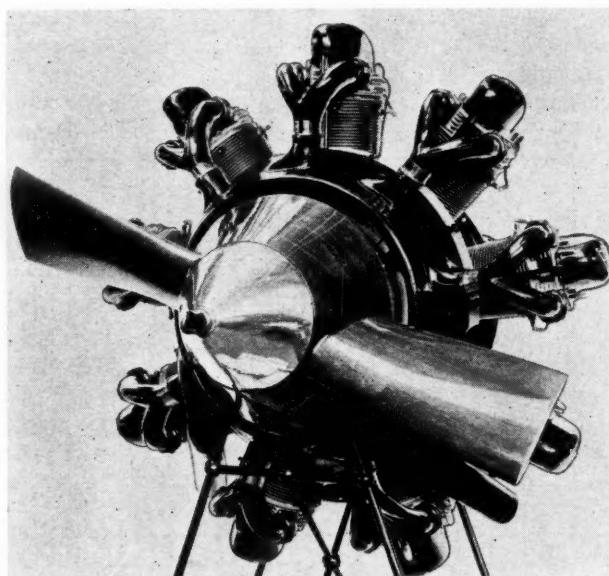
The centrifugal compressor is brought into engagement by means of a clutch operated by a lever, and is geared up in relation to the engine, although the ratio is not stated. The body of the compressor is in two parts in Alpax metal, the parts being united by twelve bolts so the angular location of the inlet in relation to the out-

let can be raised by steps of 30 deg. The total weight of the compressor is 110 lb. While it is possible to adapt a compressor of this type to most engines, there would be advantage in standardizing so that any engine could receive a supercharger as desired. Tests have been carried out at the French Government Laboratory at Chalais-Meudon, and one engine has been accepted after a 50-hour test. An engine of 500 hp. maintaining its full power up to 19,000 ft. would increase its speed from 130 m.p.h. at ground level to 165 m.p.h., and it is claimed that if Lindbergh's machine had been supercharged it could have flown to Paris in 18 hours.

The Bristol Jupiter air-cooled engine of 146 by 190 mm. bore and stroke is shown with both a supercharger and a reducing gear, the latter being the Farman type. The blower is of the high speed centrifugal type embodying various patented features which are claimed to eliminate the inertia problems inherent

with this type of mechanism. A system of slipping clutches insures that the impeller is protected from shock loads, the torque in the blower drive being practically constant.

The unit is mounted immediately behind the rear wall of the crankcase, concentric with and driven from the tail end of the crankshaft, around which it revolves. In order to retain simplicity of the standard type of carburetor and controls, the triplex carburetor is mounted on the intake side of the blower, the mixture being drawn axially into the impeller and discharged radially via a fixed diffuser into the annular diffusion chamber, which replaces the induction spiral. From this



Bristol nine-cylinder radial engine with reducing gear and stream-lining of propeller hub which directs a current of air onto the exhaust collector

chamber the mixture is fed to the cylinders by nine radial pipes in the usual manner. The engine retains its full normal power up to 12,000 ft. At this height the increase in power compared with Series VI engine, which has the same piston displacement, is over 30 per cent, while the increase in weight is only about 5 per cent.

Commercial and military planes are about equally represented, but this does not reflect actual development, for in many cases where makers had room for only one plane they seem to have preferred to place a military machine on view. A certain number of important French firms are absentees this year, for some unexplained reason.

Few Multi-Engined Planes

There are few new developments in multi-engined planes, and with the exception of the Dornier "whale," which is shown as a model, there are very few with more than three power units. Usually the commercial planes are two-engine types, and among the new models is the Farman F 180 de luxe biplane passenger carrier, the fuselage of which forms a cabin for 20 passengers seated or 12 passengers reclining on berths. The cabin has a length of 26 ft., the pilot house, with duplicate controls, being in the forward portion. Two Farman 500 hp. engines are mounted in tandem in the top plane.

This machine, which is one of the biggest in the show, has a wing area of 1850 sq. ft., while the total loaded weight is 17,600 lb. Its cruising speed is 100 m.p.h. and its maximum speed 118 m.p.h. Its ceiling is 13,100 ft. Construction is wood.

In addition to the machine with which Costes and Le Brix flew round the world, Breguet has on exhibition the transport type 280T, with 500 hp. geared Renault engine. It is a high-speed eight-passenger sesquiplane with an area of 600 sq. ft., a total loaded weight of 7300 lb., a commercial speed of 124 m.p.h. and a radius of action of nearly 700 miles.

All-metal construction shows considerable progress compared with the two previous shows, and appears likely to drive out wood construction.

In several cases national in place of individual exhibits were arranged, one example being Italy, which showed the Savoia-Marchetti twin-hull flying boat, similar to the one with which Pinedo crossed the South and North Atlantic, fitted with two Isotta Fraschini Asso engines; the Macchi Schneider Cup type with which De Bernardi set up the world's speed record of 318 m.p.h., and a military two-seater Fiat fitted with a Fiat 500 hp. A22 engine.

New Coleman Truck Has Six-Wheel Drive

A NEW six-wheel drive model has been developed by the Coleman Motors Corp., Washington, D. C., for handling very heavy loads off the regular highways. The engine, which is mounted forward of the front axle, is a 4½ x 6 in. six-cylinder Buda Model GL. A starter and generator are fitted and battery ignition is used.

The two tandem-mounted rear axles are worm drive Wisconsin axles with "double-ended" worms. Each axle is connected to the frame by two semi-elliptic springs, which are pivoted to a bracket located on the frame between the two axles and shackled to brackets at the opposite ends. No torque members or radius rods are

used, the torque and drive being taken through the springs. In addition to the semi-elliptic springs, load is taken through two pairs of helical springs mounted above each axle and to either side of the worm-shaft housing. Power is transmitted from the forward axle to the rear axle through a short propeller shaft equipped with two universal joints. Differentials, axle shafts and all other parts except the worms and worm shafts are interchangeable front and rear. The front axle is a Wisconsin double reduction axle to which the Coleman type front wheel mechanism is fitted.

Combined with a Fuller four-speed HU-16 transmission is the Coleman auxiliary transmission giving transmission ratios of 1-1 in high and 3.48-1 in low. This combination gives the vehicle eight speeds forward and two reverse, the former ranging from 8-1 to 176-1. The Spicer drive shafts run with practically no angularity under loaded conditions.

No differential is fitted between the front and rear axles, and this fact, combined with the use of locking differentials in all of the axles, is said to assure positive drive at all times.

A Westinghouse air compressor driven from the timing gears is used in connection with service brakes which act on the four rear wheels. The hand brake is mounted on the auxiliary transmission at the center of the drive system.

The wheelbase is 144 in. between the front and forward rear axle and 53 in. between the two rear axles. The frame provides 216 in. of loading space behind the cab.

While the truck is furnished with 42 x 9 in. single pneumatic tires on all wheels, 42 x 9 in. dual pneumatics can be supplied on all rear wheels when necessary. A power tire pump on the transmission is furnished as regular equipment.

Steering is by Ross cam and lever type gear. Two cylindrical gasoline tanks, one on each side of the frame, carry 22 gal. each. Feed to the carburetor is by a special 2 gal. Stewart vacuum tank mounted on the dash.

The steel frame cab is Vehisote-paneled and mounted on its own sub-frame, which in turn is mounted on the main frames at three points. Cabs of both the open and closed type are available in three different widths.

FACILITIES for free importation of French automobiles coming from the Colonies and possessions into France have been accorded by a decree just issued by the Ministry of Finance. In the past all automobiles coming into French territory were considered to be of foreign origin, unless the owner had taken the precaution to get a certificate of nationality before exporting them. It frequently happened that Government officials, returning home with automobiles they had taken out of France, were obliged to pay full duty on them. Under the new regulations it is possible to prove the nationality of the automobile and import it free of duty whether it has been purchased in France or in a French colony.

American dealers and distributors in Europe have been asking for several years that the United States Government accord similar facilities to persons having purchased American automobiles abroad and desiring to take them into the United States.

ACCORDING to recent official statistics, France had at the end of 1927 a total of 642,744 passenger automobiles, 325,587 motor trucks, 865 motor trucks with gas generators, 27,450 small cars (cycle cars) and 232,201 motorcycles.

Torsional Strength Figures Given for Axle Shafts

Results of tests on shafts of various grades of steel show moments which cause failure. Elastic limits also determined by torsion testing machines.

By P. M. Heldt

AXLE shafts of full-floating axles and the inner ends of the axle shafts of semi-floating axles are subjected to torsion only, and the dimensions which must be given the sections depend upon the shearing strength of the materials from which the shafts are made. There is comparatively little data available in book and periodical literature on shearing strengths, and what there is often indefinite or incomplete. For instance, in C. Bach's *Elastizitaet und Festigkeit*, which as a whole is an excellent source of metallurgical data, there are given the results of torsion tests on test specimens of chrome nickel steel, but neither the composition of the steel nor its treatment is given.

Accurate determination of the torsional strength of rear axles is necessary because the factors of safety are generally quite low. For these reasons manufacturers of cars and axles test sample shafts in a torsion machine to determine the torsional moment necessary to bring the shaft to the elastic limit and the moment required to cause it to fail. Incidentally the torsional deflections are determined.

The shearing stress in a shaft stressed below its elastic limit in torsion can be calculated from the equation

$$S = \frac{M}{0.196 d^3} \text{ lb. p. sq. in.}$$

where M is the moment on the shaft in lb.-in. and d the diameter of the shaft in inches.

Under these conditions of loading the stress in the material of the shaft varies uniformly from the axis outward, being zero at the axis and a maximum at the surface of the shaft. Thus if the moment which causes the shaft to attain its elastic limit is known, the elastic limit in shear of the shaft material can be readily calculated.

Equation Doesn't Always Hold

The above equation, however, does not hold when the stress in the outer fibers exceeds the elastic limit. When the shaft is thus loaded the stress will still increase uniformly from the axis outward up to a radius where the fibers are subjected to a stress equal to the elastic limit. Beyond this radius the stress will increase less rapidly. The relations are shown in Fig. 1, in which the horizontal scale represents the radius of the shaft while the vertical scale represents stress on the fibers of the shaft. It will be seen that where the outermost fiber is stressed below the elastic limit, the increase in fiber stress from the axis outward can be represented by a straight line, whereas in the case where the fibers near the circumference are stressed beyond the elastic limit only the first portion of the line representing the increase in fiber stress from the axis outward is

straight, while during the latter portion the inclination of the line toward the horizontal axis decreases constantly. The test result, of course, is a summation of the stresses on all of the fibers (into their respective distances from the axis), and if the maximum stress were calculated from it on the assumption that there was uniform increase in stress from the axis outward, the result, indicated by the dotted line, would be too large. The result thus calculated is not the actual fiber

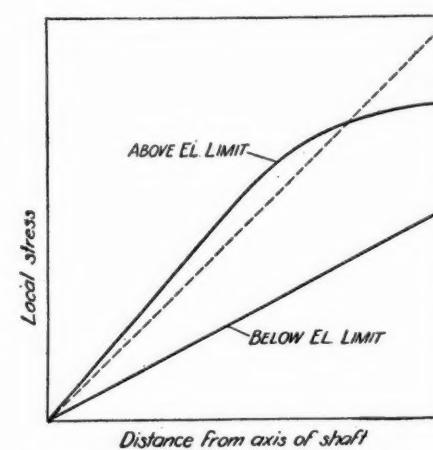


Fig. 1—Relation between shearing stress and distance from axis

stress in the outermost layer but is a figure of some value in making comparisons of different materials, and that obtained from the value of the moment which causes failure may be referred to as the apparent ultimate strength in torsion.

In making tests to determine the elastic limit in torsion

the shaft is placed in the Olsen or other torsion testing machine and the torsional moment on it is increased stepwise. With each increase in the moment there is an increase in deflection, and the deflection for each moment is carefully noted. After all the data is at hand a curve of torsional moment vs. deflection is plotted, and the point where this graph begins to curve denotes the elastic limit. It might be pointed out in this connection that the departure from the straight line is at first very slight and hardly perceptible, for the reason that only the fibers at the surface of the shaft have reached the elastic limit and begun to yield at a more rapid rate than the rest, hence, if it is desired to get the true elastic limit the point at which there is the least perceptible deviation from the straight line should be selected as indicating this limit.

Torsion test figures for a steel often used in propeller shafts were given by C. W. Spicer in a paper on Torsional Strength of Multiple-Splined Shafts read before the S.A.E. at its Summer Meeting in 1927. The steel used corresponded to the S.A.E. No. 1045 steel, containing 0.440 per cent of carbon, 0.630 per cent manganese, 0.034 per cent sulphur, and 0.017 per cent phosphorus. The heat treatment consisted in heating

to 1625 deg. Fahr., and cooling in air; heating to 1525 deg. Fahr. and quenching in water, and finally drawing at 1200 deg. Fahr. for 30 minutes.

Solid round test specimens with an average minimum diameter of 1.539 in. showed an elastic limit in torsion of 33,100 lb.-in., while shafts with an average minimum diameter of 1.315 in. showed an elastic limit in torsion of 21,600 lb.-in. These figures give elastic limits in torsion of 46,350 and 48,400 lb. p. sq. in. for the larger and smaller shafts respectively, the larger value for the smaller shafts evidently being the result of a more effective heat treatment. The moments which caused the shafts to fail were 69,200 and 46,300 lb.-in. respectively, which give apparent ultimate strengths in torsion of 97,000 and 104,000 lb. p. sq. in.

The enormous differences between the figures obtained for the ultimate strengths and the elastic limits are immediately apparent; they are explained by the fact that the ultimate strengths given are apparent only and considerably above the actual ultimate strengths in shear, and in reality the proportion between the elastic limit and the ultimate strength in shear is about the same as the proportion between the ultimate strength and the elastic limit in tension.

Chrysler Data

Figures of torsional strengths of alloy steel rear axle shafts were furnished the writer by the engineering departments of the Chrysler Motor Corp. and the Hupp Motor Car Corp. Chrysler rear axle shafts are made of chrome nickel steel, the more highly stressed shafts in the larger cars being made of the high alloy 3400 series and the less highly stressed shafts of the smaller cars of the 3100 series. The latter steels correspond substantially to the S.A.E. 3145 steel, except that the carbon range is somewhat narrower, the carbon being held between 0.43 and 0.48 per cent instead of between 0.40 and 0.50 per cent. The shafts from this steel are annealed at 1550-1600 deg. Fahr., oil-quenched at between 1550 and 1600 deg. Fahr., and drawn at approximately 1000 deg. Fahr. to show a Brinell hardness of between 286 and 321 in the case of the smaller of the two models employing this material and to between 300 and 340 in the case of the other model.

The average angle of torsion at the elastic limit obtained with a number of these shafts was 35 deg. and the average torque required to stress the shafts to the yield point was 18,500 lb.-in. Since the smallest diameter of these shafts is 1 in., the elastic limit in torsion figures out to 94,400 lb. p. sq. in. The average angle of torsion at break was 444 deg. and the average torque causing failure, 26,200 lb.-in., giving an apparent ultimate strength in torsion of 134,000 lb. p. sq. in.

The high alloy chrome nickel steel corresponds substantially to S.A.E. steel No. 3435, except that, as in the previous case, the carbon range is held down to eight points instead of 10. The heat treatment for this steel starts with annealing, after which the shafts are rough machined. The reason for this is that in the final heat treatment the shafts are drawn at a quite low temperature, leaving them so hard that machining is quite difficult. After the rough machining the shafts are heated to 1500 deg. Fahr. and quenched in oil, and they are then drawn at between the temperature limits of 850 and 900 deg. Fahr. to give a Brinell hardness

of between 340 and 375, as per specifications.

In tests, several shafts made of this material showed an average angle of torsion of 42 deg. at the elastic limit and 150 deg. at the break. The average elastic limit in torsion was 127,200 lb. p. sq. in. and the average apparent ultimate strength in torsion, 144,000 lb. p. sq.

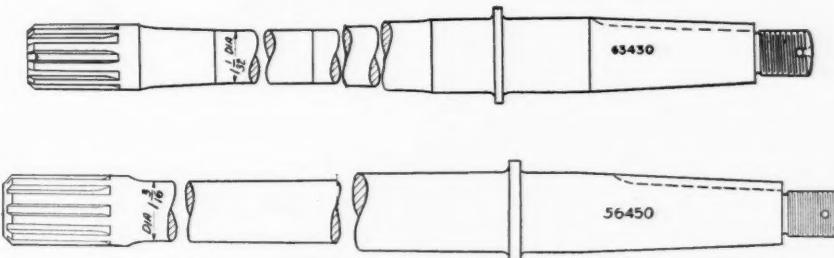


Fig. 2—Hupmobile shafts

in. It is interesting to compare these values with the results of tensile tests. The average elastic limit in tension was 181,000 lb. p. sq. in. and the average ultimate strength, 195,000 lb. p. sq. in. Thus the elastic limit in torsion is just over 70 per cent of the elastic limit in tension. The average Brinell hardness of all of the test specimens of this steel was 387.

The elastic limit and ultimate strength in tension of the 3145 steel were also given and varied between 70.5 and 91.5 per cent of the elastic limit in tension of the same materials.

Rear axle shafts sometimes succumb to fatigue failure or progressive failure. Such failures originate from slight surface defects of the parts. For instance, it has been common practice to stencil certain data, such as the number of the heat, on the shaft after machining, and the fatigue cracks then generally start from the stencil marks. For this reason the stenciling of axle shafts is to be discouraged.

The splined ends of axle shafts also are given to fatigue failure unless they have a bottom diameter larger than the diameter of the solid portion of the shaft. Such fatigue failure fractures have a characteristic appearance. Failure apparently starts at the bottom corners of the splines and works inward toward the axis of the shaft, giving the fracture a star-shaped appearance. By making the bottom diameter of the splined portion $\frac{1}{8}$ in. larger in diameter than the adjacent solid portion such failures can be prevented. The upset splined portion should have a large radius where it joins the solid section, so as to prevent all concentration of strain at the change in section. This end may be attained even more completely by not running the milling cutter all the way through the upset portion when cutting the splines, so the spline grooves become shallower toward their inner end.

Chromium-molybdenum steel is used in the axle shafts of the Hupmobile. The steel has the following analysis (according to specifications): Carbon, 0.35-0.45 per cent; manganese, 0.40-0.70 per cent; sulphur, 0.045 per cent max.; molybdenum, 0.30-0.40 per cent; chromium, 0.80-1.10 per cent. The steel is normalized at 1625-1650 deg. Fahr., heated to 1500-1550 deg. Fahr. and quenched in oil, heated to 1025-1075 deg. Fahr. and cooled in the air. The specifications call for a Brinell hardness of between 285 and 321. In tensile tests this steel shows an elastic limit of 140,000 lb. p. sq. in.; an ultimate strength of 175,000 lb. p. sq. in., and a reduction of area of 55 per cent.

A rear axle shaft No. 70,374, from production,
(Continued on page 131)

Helical Gear Problems Simplified by Graphical Analysis

Does away with long, tedious mathematical trial calculations required when dealing with gears with shafts at 90 deg.

By Robert P. Lewis
Experimental Design Engineer, Marmon Motor Car Co.

HELICAL gears have been commonly miscalled "spiral gears." Effort should be made to abandon this term, as it is a misnomer. This fact is mentioned merely so that the reader, who heretofore may have known helical gears as "spiral gears," will not be confused.

There are three types of helical gears, distinguished by the angle of the shafts. The two most commonly used are those having shafts parallel and those with shafts at 90 deg. Practically every automotive powerplant made today employs one or more sets of helical gears. Those with shafts parallel are generally employed for quieting purposes in camshaft, generator, and water pump drives, and in oil pumps and some transmissions, while those with shafts at 90 deg. are used for driving small units such as oil pumps, distributors, speedometers, etc. A third type, with shafts other than at an angle of 90 deg., is very seldom used, partly because of the intricate machining necessary. In fact, the writer does not know of a single case where this type is being used in the automotive field.

Trial Operations Tedious

Although the calculations of helical gears are not complicated, many tedious trial operations must be made, taking considerable time to perform. Many articles have been written on methods of calculation, but very little has been published regarding the more simple and rapid graphical method. It is the purpose of this article to place in the hands of designers a graphical analysis of helical gear problems which does away with the long, tedious mathematical trial calculations.

As the calculation of helical gears with parallel shafts is simple and direct, and as those with shafts at angles other than 90 deg. are seldom used, this article is confined to the type having shafts at 90 degrees.

Fig. 1 shows a set of helical gears with shafts at 90 deg. It is usually desirable that the center distance C be as short as possible in order to maintain a compact installation, thereby saving weight, material and cost. To obtain this ideal condition, it is necessary to design the gears about known centers, or to centers very closely approximating a given distance, so the following graphical analysis is based upon the assumption that the centers are known. This will also prove valuable in designing gears to be used on shafts for which the bearings have been located already.

As the minimum center distance for small power drives is usually determined by the shaft, hub and bearing diameters, clearances, etc., a preliminary layout should be made, similar to that shown in Fig. 1. In determining the centers for small power drives, the strength of the gears need only be considered of secondary importance, but in determining the centers for larger drives, the strength should be considered of greater importance, as by increasing the center distance the tooth pressure and the wear can be reduced.

Having obtained the center distance C by the preliminary layout, we are ready to proceed with the graph. The designer should remember that the larger the scale used, the more accurate will be the results. It is a good plan to make a few rough graphs full size, or twice size, until approximately the desired conditions are determined, and then make a more accurate graph to a larger scale.

Referring to Fig. 2, lay out lines EF and EG , 90 deg. to each other. Select the normal diametral pitch P that is to be used, and assume the number of teeth

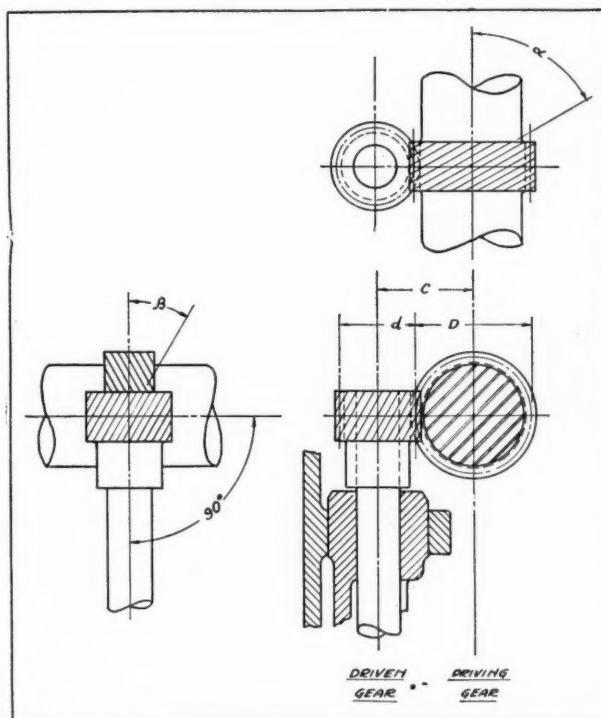


Fig. 1—Typical layout of helical gears with shafts at 90 deg.

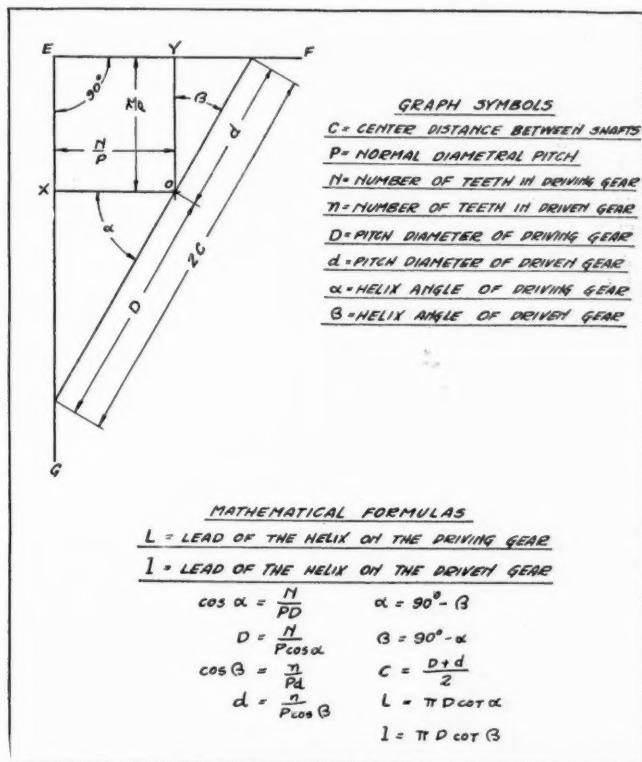


Fig. 2—Graph for the solution of problems arising in the design of helical gears with axes at right angles

N for the driving gear and the number N for the driven gear, keeping the desired ratio of $N:n$. Calculate the value of N/p and n/P , then locate the point O according to the scale selected, drawing horizontal and vertical lines OX and OY . Remember that all measurements must be made to the same scale. Now lay a scale, representing twice the center distance, $2C$, on the graph, the edge of the scale passing through point O and the ends just touching the lines EF and EG . The measurements D and d will be the pitch diameters, and the angles α and β the tooth helix angles of the driving and driven gears respectively.

Due to the necessity of maintaining certain hub diameters, clearance limits and cutting possibilities, the pitch diameters of the gears must be held within certain maximum and minimum limits. A convenient method of doing this, by making a scale from a sheet of paper, is shown in Fig. 3. On the edge mark off twice the center distance ($2C$) to the scale that the graph is made to; also mark the maximum and minimum pitch diameters permissible. These can be determined by referring to the preliminary layout. Use this improvised scale in place of the standard scale. If the dimensions D and d on the graph fall within the limits shown on the scale, the design is practical. If not, the location of point O must be changed. To do this, change either the diametral pitch P or the number of teeth N and n , or both. If the number of teeth are changed, be sure that the desired ratio of $N:n$ is maintained. For some drives it is not necessary to maintain an exact ratio, an approximate ratio being satisfactory. This permits a more rapid solution, as fewer trials will be required.

The helix angles must also be considered, whether or not they are of a practical nature. The angles to be used should be chosen the same as when using the mathematical method. It is good practice to have the maximum thrust taken by the gear having the larger shaft and thrust bearing surface. This is usually the driving gear. The writer believes that for most cases,

a good practical angle for the driving gear (α) would be between 55 and 60 deg., and for the driven gear (β), between 30 to 35 deg. A few additional notes, for choosing the correct angle, are given at the end of this article. In some cases, such as speedometer drives, it is necessary to use extreme angles, these being as large as 70 to 85 deg. for the driving gear (α) and as small as 5 to 20 deg. for the driven gear (β). Where the power required to be transmitted is very small, these extreme angles can be used satisfactorily. The angle (α) of the driving gear should never be less than 45 deg., and that (β) of the driven gear never more than 45. If the angles shown on the graph do not appear practical, they should be changed by relocating the point O , this being done the same way as mentioned previously in connection with pitch diameters. Several trials may be necessary before all conditions are satisfied.

To avoid any small errors, the graphical measurements should be checked by the simple mathematical formulas given in Fig. 2.

Measure the pitch diameter of the driving gear D on the graph and solve for the angle α by the formula

$$\cos \alpha = \frac{N}{PD}$$

Then find the angle β by the formula

$$\beta = 90^\circ - \alpha$$

and solve for the pitch diameter of the driven gear (d) by the formula

$$d = \frac{n}{P \cos \beta}$$

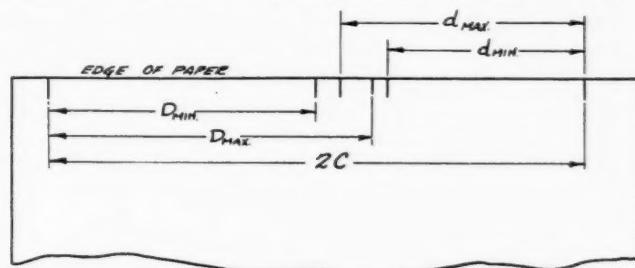
Now find the actual center distance C by the formula

$$C = \frac{D + d}{2}$$

This usually comes within a few thousandths of the original center distance used on the graph and layout. The calculated centers should be substituted for the original, the difference between the two being so small that the original layout should not be affected. However, if the centers must be exactly as the original, a few trial calculations are necessary, changing the angles and pitch diameters slightly, to get the desired results.

In Fig. 2 the formula for the lead is given for reference, as this should be calculated and placed on the details of the gears, for the machinist's information.

The graphical analysis does not consider the direction of rotation, direction and magnitude of thrust, strength and wearing condition of the teeth. These must be considered, the same as when using the math-



MAKE DIMENSIONS TO THE SAME SCALE

AS USED ON THE GRAPH.

Fig. 3—Drawing for a scale to be made from paper, to be used in making the graph, Fig. 2

ematical method. Rules governing these conditions may be found in almost any mechanical engineering handbook.

The design of helical gears is of more or less "elastic" nature, and by making a few permissible changes almost any desired results may be obtained. Any one of the factors involved, such as center distance, pitch diameters, number of teeth, diametral pitch and helix angles, may be retained, provided others can be changed. The graphical analysis clearly shows how this may easily and quickly be done, and permits the possibilities of a design to be seen at a glance.

A few notes regarding the design of helical gears with shafts at 90 deg. follow:

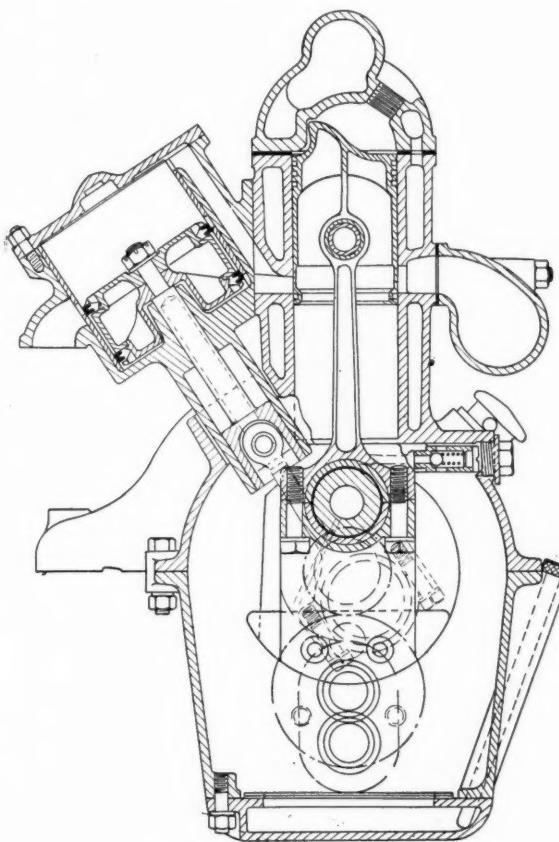
1. The angle β should never be greater than 45 deg.
2. The power required to drive helical gears increases when the angle β is reduced. However, the increase is very small for angles between 45 and 30 deg., so may be disregarded in the design of drives consuming a small amount of power.
3. The thrust in the direction of the driving gear axis increases when the angle β is reduced.
4. The thrust in the direction of the driven gear axis decreases when the angle β is reduced.
5. The force tending to separate the gears increases when the angle β is reduced.
6. Increasing the pitch diameters reduces the pressure and wear on the teeth, and also reduces the force tending to separate the gears.

Piston Distributor Used on New Two-Stroke Engine

A PISTON distributor and a special type of deflector assuring a high degree of turbulence are among the features of a two-stroke engine produced by the Francon Co. of Paris, under Chedru patents. The engine is a four-cylinder of 61 cu. in. piston displacement, having a bore of 62 mm. and a stroke of 82 mm.

The fresh gases are admitted and the spent gases

are exhausted through ports uncovered by the piston. This latter is fitted with a deflector of such a shape that, as will be seen from the drawing, it sets up a high degree of turbulence in the combustion chamber.

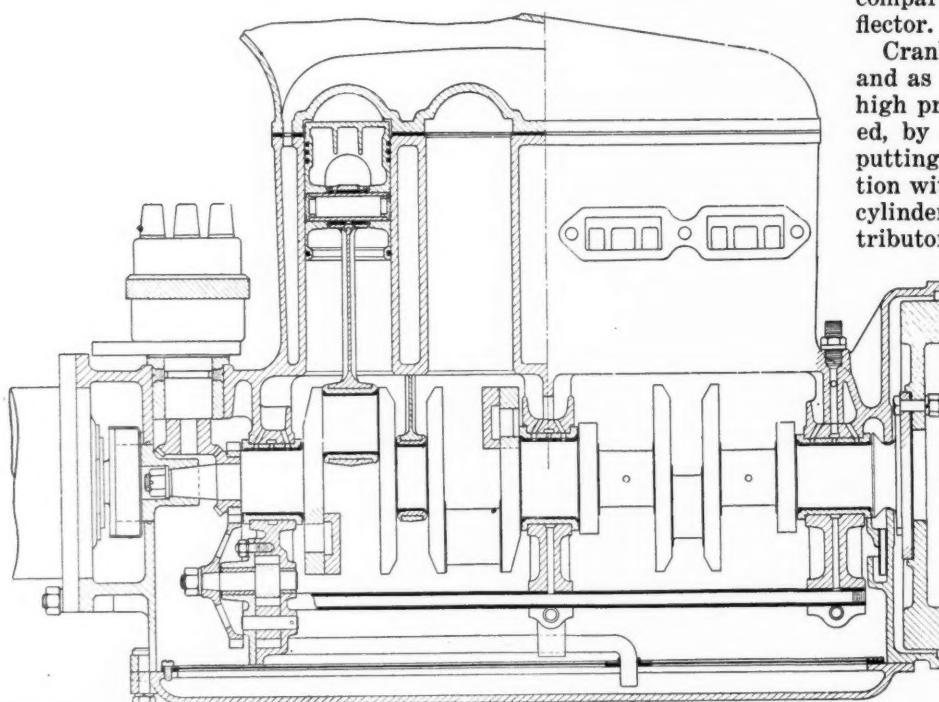


Cross-section of Francon engine

The detachable cylinder head is spherical and completely machined, and has the spark plug inclined in it. It is claimed that this feature alone results in a considerable increase in power and greatly improved slow running compared with the normal type of deflector.

Crankcase compression is avoided, and as a consequence a normal type of high pressure lubrication can be adopted, by the use of a piston distributor putting the carburetor into communication with the intake port. For the four-cylinder engine there are two such distributors, driven by eccentrics off the crankshaft. These pistons operate in supplementary cylinders, having a bore of 90 mm., inclined on one side of the engine, and are of the double ended type. Both the upper and the lower faces are perforated, the gases entering behind the ring, passing through the holes, thus being atomized and then into the combustion chamber. The upper face of the piston communicates with one cylinder, and the lower face with the companion cylinder.

The engine has a compression ratio of 5.5.



Longitudinal section of Francon two-stroke engine

Just Among Ourselves

A Perfect Guide for Business Success

WHILE taking a vacation last week we discovered a man whose life and actions furnish almost a perfect guide for business success. We had heard of him plenty of times before, to be sure, but we never liked him nor thought much of his methods since we had judged him largely by the advice which he has handed out about how to get on in the world and not at all by his own actions. Probably you have heard of him too. His name was Benjamin Franklin and he was a very shrewd, practical, human, companionable old chap, very different from the sort of person we had always visualized as a result of the stuffy maxims through which he has been chiefly known to American youth. Franklin—if Philip Russell's enthralling book, "Benjamin Franklin, the First Civilized American," is to be accepted as authority—"at the age of 24 becomes the head of his own business, without having saved any money, without having worked unusually hard, without having omitted any of the pleasures beloved by imaginative youth and without having lived up to any of the maxims for which he is later to become renowned."

* * *

Rise Due to Knowledge of Human Nature

WHILE no career probably was ever fuller of hard and continuous work than was Franklin's and while probably few men have performed greater services to their country and to their fellow men, his life as it was actually lived indicates clearly that it was an intense interest in and a constant study of human nature that made possible his successes, rather than

any didactic and rigid application of the advice meted out in Poor Richard's Almanac. Sympathetic of the standards and foibles of others, mentally relaxed in his approach to problems and people, possessed of a keen wit and of intense curiosity about everything in the world, particularly in its possible practical applications, Franklin himself would seem to offer an almost perfect model for a successful executive in modern industry—a far more perfect model than could ever be built up from what he said and wrote. Human understanding enabled him to succeed time and time again where go-getters and direct actionists failed. The real Franklin offers an interesting study for any executive in charge of industrial operations today.

* * *

Many Changes Occur in Two Years

WOULD you or could you have written two years ago those last two sentences in the Cabell item in Just Among Ourselves of July 14?" queries one of our constant readers and severest critics. The gist of the sentences was that it is hard to absorb new ideas because the mind is constantly judging these ideas in terms of previously conceived rigidities or standards but that "only through emotional as well as mental absorption can the spirit of strange things be caught." My answer to this correspondent is "No." We might add that, except in the realm of practical facts, there are plenty of things on which our statement today would be quite different than it was two years ago and—it is our hope—on which it will be different again two years hence. Acceptance of the principle of constant change as a normal

routine of mental as well as industrial life is constantly appealing more and more as being about as near to fixed belief as one dares come without the danger of being left far behind the procession in a very few years.

* * *

Progress Demands Constant Change

FROM an automotive standpoint, for example, something like the principle seems to be gaining increased acceptance as time goes on. Manufacturers today are actively experimenting with types of design and construction about which they have known for years but which caught little practical interest for a long while. Now the various companies seem to have come to feel that constant change is probably necessary for their own organizations and for the industry as a whole; consequently they are studying and trying out a vast multitude of things to determine in which direction these future changes can best be pointed. That persistent progress is to be a normal part of future routine is simply becoming an accepted fact. To keep up with an industry which seems to be operating on that idea as a basis, any given individual would seem to be under the necessity of being able as well as willing to absorb new ideas more or less constantly.

* * *

Consolation for the Cynic

WHICH brings to mind a statement by Ernest Boyd in his "In Defense of Cynicism" article in a recent *Harpers* to the effect that "only the cynic is capable of drawing the obvious conclusion that the fewer one's beliefs the greater one's peace of mind."—N.G.S.

THE FORUM

Wood Airplane Construction Urged Where *Resiliency* is Required

Suggestion is made that certain parts could be standardized from lumber, as is done in automobile industry

Editor, AUTOMOTIVE INDUSTRIES:

The article in your May 12 issue on the expansion of the airplane industry, by John F. Hardecker, brings to mind a few comments on the subject. In the main I feel that Mr. Hardecker has hit an important note, yet the matter of construction will still bear a lot of thought.

As for the all-metal plane, there may be something saved in production cost; but there is still a locality here and there where lumber—good lumber—is obtainable cheap enough to make it well worth while to standardize parts from this lumber.

There is also the question of resiliency, which is recognized by one of the big automobile manufacturers and one of the great truck manufacturers. Both have been in business long enough to amply prove their theory sound and correct; and perhaps the airplane industry may do well to ponder this use of wood as at least an auxiliary to the whole item, in wing and fuselage construction.

As for production and accuracy of production, we might look over the automobile field again and find that several firms undertake to supply the trade (automobile manufacturers) with wood frames for bodies with their intricate curves so nicely cut and fitted that they are "knocked down" to be shipped, and are reassembled at destination, where previously drawn sheets fit them exactly. Proper machine tools and men trained to use them will do as much for airplane production.

Advantages of Flexibility

It is a well-known fact that in boat design and construction, a flexible hull will offer resiliency to wave action and pressures reacting very favorably to speed, ease of riding in rough water and longer life of the vessel. A study of bird wing action shows how applicable this flexibility is to the airplane. The soaring of the buzzard for hours at a time with not more than a "bank" now and then, with just a perceptible flexure of the wing line when a "bump" is met with, shows that the "bank" is not carried out with a straight line movement, with the body or fuselage as an axial point, but rather the feathers are curved by a tensioning of the muscles and skin with a resultant curve—something ready to give under too great pressure and to straighten out under easing of that pressure.

I may not have made out a case for wood construc-

tion; but I do not believe in wood construction entirely. I do believe in wood where resiliency is required and I should not like to see the advantages accruing therefrom lost sight of.

WILLIAM RICHARDS,
Henderson, N. C.

Right of Way at Street Intersections

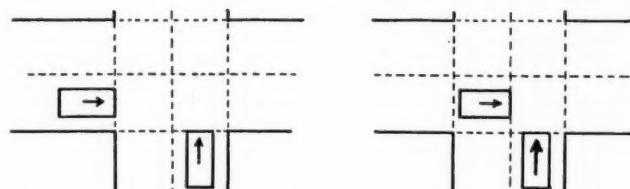
Editor, AUTOMOTIVE INDUSTRIES:

In your issue of May 12 I note Mr. Buford's letter on "right of way" and also a digest of a "Model Traffic Ordinance for Cities" by Donald Blanchard.

If Mr. Buford insists on taking into account which car enters the intersection first then his argument looks good to me. Just what good reason there is for taking this into account is beyond me, but it is the old rule and is slow and hard to die.

Take boats for instance. When boats approach each other the boat on the starboard tack has the right of way. No intersection to watch or beat the other fellow to. No argument at all. The boat on the port tack takes all the blame if the slightest collision occurs.

I drove a car for 20 years under the old law of beating the other fellow to the intersection. I saw collisions but never did see one nor hear of one where the time at which both cars entered the intersection could be determined with any probability of fairness. In some states the definition of intersectional lines is also different, thereby adding to the confusion. For example, note these diagrams which show two systems used.



In each case cars are shown entering the intersection. I am expecting that the "Model Traffic Ordinance for Cities" will be a fine thing if properly designed and then used.

This "right of way" feature is one of the most important parts. Mr. Buford has quite an argument in favor of the left-hand driver having the right of way. His argument is good. If, however, we could eliminate the feature of "time of entering the intersection," then Mr. Buford's argument would become no argument. He would probably not care. This is just an example of how a simplified right of way clause would eliminate 90 per cent of arguments.

I know of one state which has used the following section for three years:

"When two vehicles approach an intersection of public highways at approximately the same time, the vehicle approaching from the right shall have the right of way, provided such vehicle is traveling at a lawful speed." Please note that no mention is made as to who enters the intersection first and therefore no rights depend on this. The above clause is bad only for lawyers.

The writer believes strongly in one other feature. We have wonderfully wide and roomy highways capable of handling an immense amount of traffic. Why not govern traffic so that the capacity of these highways may be more fully utilized. Why should one slow moving car near the center line be allowed to plug all traffic over its entire half of the wide highway? I am glad to see that in the Model Ordinance overtaking vehicles may pass to the right if conditions permit. How much safer it would be if the law compelled all vehicles to travel as near the right curb as conditions might permit when other vehicles are approaching from the rear, and slow trucks positively. Also trucks with trailers should not follow another truck and trailer closer than 100 ft.

LEROY G. GATES.

Opel Hopes to Conquer Air With "Rocket" Machine

THE car shown here is the so-called "Rocket" which was demonstrated recently on the Avus automobile track at Berlin by Fritz von Opel, motor vehicle manufacturer. Von Opel said the object of his experiments with the car was the development of a flying machine for high altitudes—20 miles or more up—where air resistance is practically negligible and where gasoline engines are unable to operate by reason of the rarity of the atmosphere.

During another test several weeks ago on a railway, the car having been mounted on flanged wheels for the occasion, an accident occurred and the machine was demolished. The only passenger, a cat, was killed.

The car demonstrated at Avus was an improvement on the first car tested on the Opel private track some time previous. It had 24 rockets of 3.937 in. diameter and 19.68 in. length. The ends of the rockets protrude at the rear of the car which is cut off square. There is no engine under the hood, its place being occupied by an ignition battery. The rockets burn at an explosive rate with deafening noise and with about 6 ft. of yellow flame spurting out horizontally. An immense volume of white, steamlike smoke is developed, but it is odorless and in no way offensive. Started by 8 rockets ignited in rapid succession, the car shoots forward in the same fashion a fireworks rocket shoots up into the sky. Each rocket is charged with 10 lb. of explosive.

Fritz von Opel, who drove the car himself, said that the experimental work already had advanced consider-

ably beyond the stage it had attained when the car was built, an important improvement not incorporated in the car having been made only a few days previously. He also pointed out that, contrary to the belief of many people, rockets are propelled not by the resistance of the atmospheric air to the expulsion of the gases generated by them, but entirely by mass reaction, and that, for this reason, rockets are the only means at present known by which it is possible



Opel rocket car

to impart movement to a body in a highly rarefied atmosphere.

The next steps contemplated by von Opel are as follows: First of all a car is to be built to beat the world's speed record. As Germany has no record stretch similar to the beach at Daytona, the car will be provided with railroad wheels and set going on a long, straight stretch of track, and it will then be demonstrated that the efficiency of the means of propulsion increases with the speed. Simultaneously a "rocket"-cycle will be built with the object of beating the international motorcycle speed record on the course at Freiburg in the south of Germany. Efforts will then be directed solely to the production of flying machines, one of which is already under construction. The machines are, for a start, to attain a speed of from 200 to 270 m.p.h. The stage following this development will be devoted to systematic research work to ascertain the conditions obtaining in high altitudes.

FIGURES issued by the Swiss customs authorities show that motor tourist traffic in Switzerland in 1927 increased very materially over 1926. The total number of foreign automobiles which entered Switzerland last year for a temporary sojourn of their occupants was 78,004, as compared with 50,148 in 1926 and 10,542 in 1913. One of the chief factors responsible for this very notable gain, of such great importance to the Swiss hotel and tourist trade, is said to have been the introduction, in 1924, of the provisional certificate of admission, which is good for five days and can be extended to eight or 10 days. Of the total number of foreign cars which entered Swiss territory last year, 27,762 entered on triptyques; 5714 with free passes and 45,428 with provisional certificates of admission.

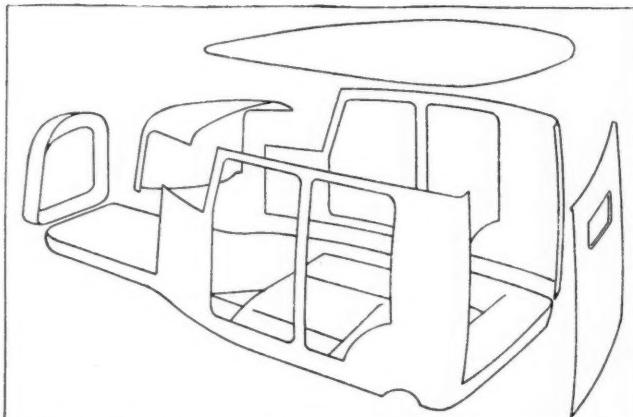


Fig. 1—Sketch of body parts which can be assembled by means of rubber compression joints

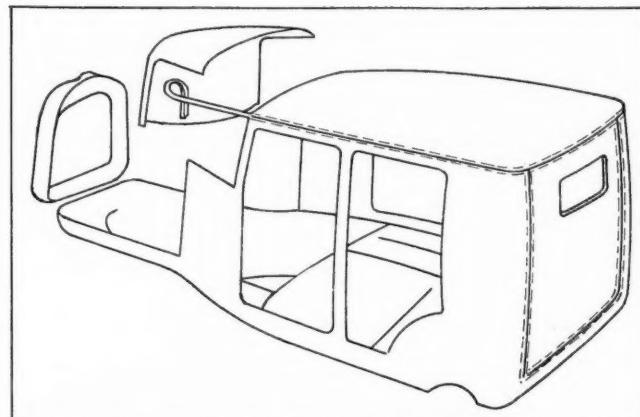


Fig. 2—Another type of body with compression joints

Rubber Joints for Body Paneling is New Development

Method of holding together stamped metal panels by rubber under compression said to eliminate squeaks and rattles. Presents no production problems.

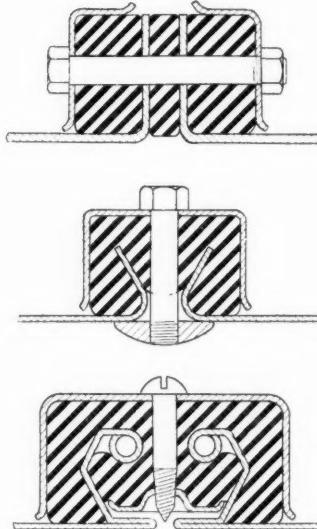
A METHOD of holding together stamped panels of sheet steel or aluminum by rubber under compression has been developed by A. F. Masury, vice-president and chief engineer of the International Motor Co., who also originated the rubber shock insulator. The new method of construction is controlled by the Rubber Shock Insulator Corp. of Bridgeport, Conn.

It is claimed that with the new method of manufacture a body can be produced that has the advantages of leather fabric bodies but still can be made in quantity by present manufacturing methods. One of the principal advantages of the body employing this principle is that it will not drum.

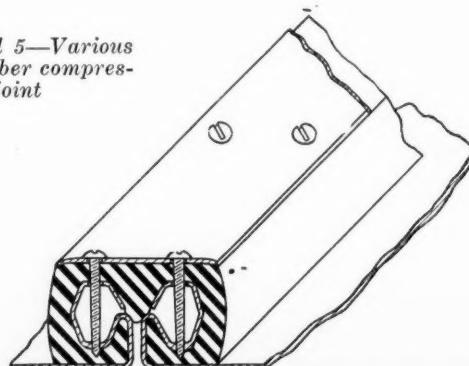
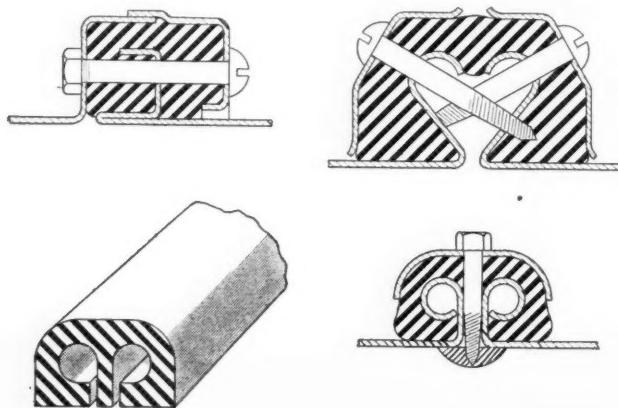
Fundamentally the method consists in providing the panels with turned-over edges, a rubber molding being snapped over these edges and the whole joint put under compression by clamping in some way. Thus the panels, held together semi-rigidly, form a body that will not rattle, squeak or drum, according to the inventor. As

regards the shape of the rubber molding, the possibilities are almost unlimited.

Fig. 1 herewith shows a body made up of individual stampings, the floor being a part of the frame. The sides and top, as well as the cowl, are individual stampings which can be united by rubber strip joints. This type of structure probably would compare favorably in respect to quietness and ease of driving with the flexible-wood-frame, fabric-covered type of body.



Figs. 3, 4 and 5—Various designs of rubber compression joint



It is believed that the reason this latter type has not made more headway is that it is practically a hand-fitted job, using none of the modern stamping and manufacturing methods. With the new methods here referred to a body could be turned out from panels produced in the press, with pressed-in curves and lines attractive to the eye, that would be noiseless, flexible, and pleasant to ride in.

Fig. 2 shows an all-metal stamped body made of individual sheets, with a sheet used for each side and for the floor of the body, these parts being held together by means of continuous compression connections, a strip of rubber being held in place under compression. The body would be semi-rigid, and noises would not be transmitted from one panel to another. Under abnormal stresses the whole structure would weave slightly, and this ability to yield slightly under stress would protect the joints.

The method can be applied also to a type of body that has appeared in the market only recently, in which each side is in a single stamping. This design has a very strong appeal to automobile manufacturers because of the simple assembling operations with it. Of course, with a body of this type the necessary investment in dies is quite heavy, but this is largely offset by the ease with which the parts can be assembled and the rigidity of the completed structure.

Figs. 3, 4 and 5 show several different types of rubber compression joint. The rubber strip is neatly held in place and is invisible from the outside of the body. It is expected that various designs of joint would be made use of for different bodies and for different parts of the same body.

Use of this method of jointed steel stampings is not limited to the body panels. An example of other applications is furnished by the dash, which when held by the present prevailing methods often comes loose, rattles and causes annoyance. The floorboards and the windshield glass furnish other examples, and the idea may be applied throughout the entire structure of the body.

Among the important advantages offered by this method of body construction are that the stampings need not be as accurately made as if they were to be assembled by welding or riveting, and that the rubber-filled joint can be tightened up at any time during the life of the car.

Six-Cylinder Selden Truck

A NEW 2-ton model equipped with six-cylinder engine, four-speed transmission and four-wheel brakes is being offered by the Selden Corp. in three wheelbases, 151, 163 and 181 in., providing 10, 12 and 14-ft. loading spaces respectively. Chassis weight is 460 lb. and body allowance is 950 lb.

The powerplant is a six-cylinder $3\frac{3}{8} \times 4\frac{5}{8}$ in. Continental C-15 and develops 70 hp. at 3200 r.p.m. Starting, lighting and ignition is by battery with coil and distributor for ignition. The fuel system includes a 15-gal. tank located under the seat and a vacuum tank. The radiator is of the cellular type with nickel plated shell.

The dry-plate clutch and four-speed transmission are mounted in unit with the engine. Power is transmitted to the rear through a two-piece propeller shaft equipped with self-aligning center bearing and grease-tight metal universal joints. The rear axle, of the bevel gear type, provides a final reduction of $6\frac{1}{2}$ to 1. Drive is taken through ball and socket type radius rods.

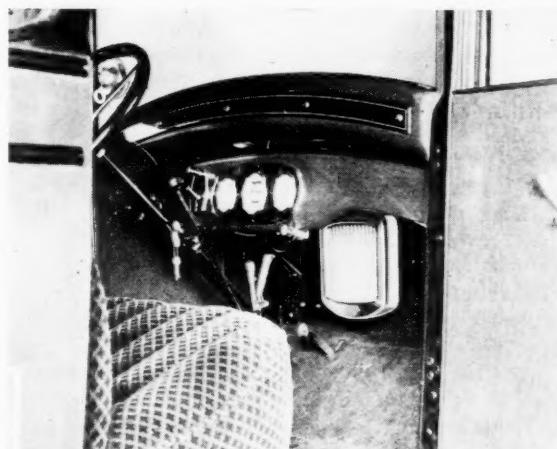
Four semi-elliptic springs, $41 \times 2\frac{1}{2}$ in. front and 50

x $2\frac{1}{2}$ in. rear, support a pressed-steel frame of $5\frac{3}{4}$ in. section, $3\frac{1}{2}$ in. flange and $\frac{1}{4}$ in. stock. The front and rear end of the rear springs are not shackled, but contact against brackets. Under this type of construction, as the load is applied the length of the springs supporting it shorten and the rate of deflection decreases. Service braking is through Lockheed hydraulic system acting on $16 \times 2\frac{1}{2}$ in. drums mounted on front and rear wheels. The emergency brake is located on the drive-shaft.

Steering is by Ross cam and lever type gear. Standard wheel and tire equipment is metal spoke type with 30×5 in. pneumatic duals rear. Optional 32×6 in. tires are available at extra cost.

Ha Dees Car Heater

A CAR heater making use of the heat absorbed by the cooling water from the engine cylinders has been placed on the market by the Liberty Foundries Co., Rockford, Ill. It consists of a Modine turbotube heater unit with core and shell, behind which is mounted a small electric fan that is supplied with current from the



Ha Dees heater installed in car

lighting and starting battery. The unit is mounted on the dash of the car as shown in the accompanying illustration. Hot water is taken from the water jacket of the engine at a point where it reaches approximately its maximum temperature, and returns to the pump inlet. Experiments are said to have shown that 100 B.t.u. per minute will sufficiently heat a closed car in zero weather. This is only a very small fraction of the heat of the fuel entering the cooling water at touring speeds.

The device is known as the Ha Dees car heater.

UNDER a new law, an annual census of automobiles, motor trucks and trailers will be held in France. All owners of motor vehicles in the country are required to fill out a printed blank during the first two weeks of January and to forward the blanks to the local authorities who in turn will forward them to the prefects of departments, whence they will be forwarded to the military authorities of the district. All owners must give immediate notification of the loss of a vehicle through fire, sale, etc. The general in charge of the army corps in the district, after receiving all of the blanks, will proceed to a classification of the vehicles declared, and the proprietors of those found useful for military service will be notified and will receive instructions as to procedure in case of a mobilization.

Mechanical Principles of Inclined Knuckle Pivots

When axis of the steering knuckle pivot strikes ground at center of tire contact, traction resistance then has no effective lever arm.

By A. L. Varga

FROM time to time, in discussing front-wheel steering, front-wheel brakes or front-wheel drive, the question arises: What is the effect of the road resistance on the knuckle pin? In other words, What is the lever arm of the force which is present at the ground contact of the tires, around the axis of the knuckle pin?

Simple as the question is, the problem seems to be quite puzzling in the case of the inclined knuckle pin construction, and one often observes that earnest minds, well versed even in higher mathematics, are expressing a wrong opinion, apparently misled by their "feeling" of the force applications instead of "keeping books" about the forces and couples present.

Fig. 1, which appeared several times in *The Forum of Automotive Industries*, presents the problem graphically. Assuming a force at the tire contact point with the ground, is the lever arm around the axis $x-x$ equal to A or B ? It often pays to exaggerate the conditions and draw the diagram as shown in Fig. 2 (although in practice this seldom can be accomplished), to help us decide whether the lever arm is B or is equal to zero? The offhand answer is of course "zero," but when it comes to detail questions, many are inclined to suggest

2) the effort is wasted and one might as well save the trouble caused by such an unnecessary complication.

The answer is that undoubtedly there is a turning moment $B \times F$ as contended, but it is counteracted by another moment in such manner that the resulting couple is $B \times A$ which becomes zero if A is equal to zero.

In the case of front wheel brakes, the discussion becomes still more variegated. Some stand by an arm B when the brakes are open and for A when the wheels are locked. Others are undecided when the brakes are partly set or are willing to "bet" on A , since they discover a counter couple arising from the brake action. When the wheel is going over an obstacle, this presents another difficulty and perhaps it is the most profitable to investigate such a case, because then we have quite a substantial force to deal with instead of the frictional resistance of the ground only.

An Experimental Rig-up

Let us assume an experimental "rig up" as shown in Figs. 3 and 4. Here we find the wheel touching an obstacle at point D , and we see a spring and a radius rod taking care of the torque and the drive. Fig. 4 shows the front elevation, and in order to present the problem clearly, let us assume that the knuckle pin axis intersects the force F at the point of contact with the obstacle.

Keeping tab of the forces which are needed for the balance, we see that the weight Q on the wheel bearing creates a couple $Q \times a$ around point D which must be overcome by an equally large couple $F \times t$ where F is the force on the bearing as well as at point D . The two ends of the spring each support a load $Q/2$, augmented or reduced by a force G , where $G \times L = F \times b$, which

Fig. 1

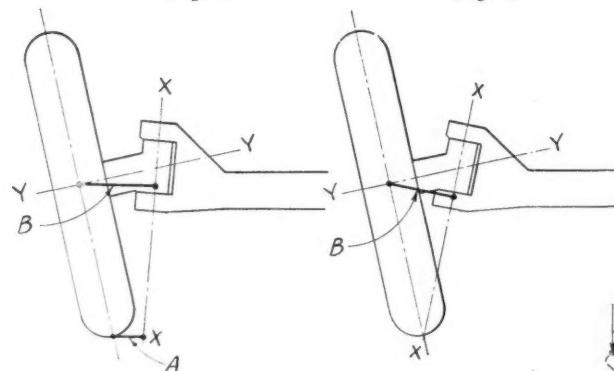
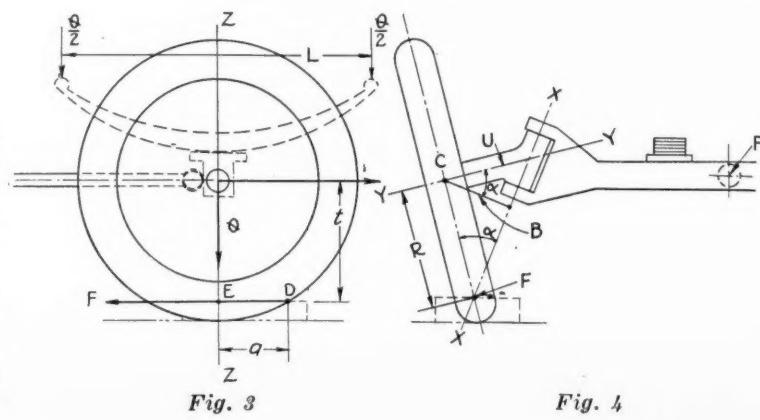


Fig. 2



gest B and are willing to support it with arguments. The favorite assertion is that the push which we must impart to the wheel in order to move it against the force F at the bottom, is taking effect at point C in the wheel bearing; therefore it must have a lever arm B by all means, and produce a turning moment $B \times F$ which tends to rotate the wheel around axis $x-x$. Furthermore, if by inclining the knuckle pin the intention was to reduce the turning moment (or nullify it as in Fig.

Fig. 3

Fig. 4

is the usual case when the springs take the torque.

The radius rod is under the pressure of force F (assuming one radius rod for each wheel), and it is connected with the front axle beam proper. Disregarding dynamic effects, the static balance is the following: The front axle assembly, including wheels, receives a force F from the radius rod and an opposite force F at D . Likewise it receives a force Q at the spring perch and an opposite force Q again at D . As far as external forces and couples are concerned, the system is in balance, but in the system itself there is an axis $y-y$ around which the axle beam and spring tend to turn when the radius rod is pushing and this $F \times b$ torque is balanced by $G \times L$ at the spring ends (b is not shown, and it can be rendered negligible by suitably locating the radius rod). The force F makes the wheel go around, of course, but this does not affect the balance, for the wheel offers an "indifferent" balance. That is, its balance is the same in any possible position around $y-y$. The force F at point D is transmitted through the system until it reaches the contact at the radius rod; therefore, it is also apparent in the front bearing as a pressure exerted on the spindle of the wheel.

An Important Difference

However, here is an important difference. This force is not the original external force at D but a transposed force, moved from D to C . The rules of static forces say that a force F (see Fig. 5) acting at a point D can be replaced by an equal force at C and by a couple $F \times R$. The simple proof of this is that we are free to add two equal and opposite forces at point C any time without disturbing the balance of forces, and by doing this, we obtain a concentrated force at C and a couple $F \times R$ caused by the forces shown in heavy lines.

A still more simple rule is that a force F acting at D (Fig. 6) can be shifted in its own direction (to a point E , for instance) without altering the problem. Thus by shifting F from D to E in Fig. 3, and by making a section through $z-z$ we obtain Fig. 7. Then it is evident that F transposed to E produces a moment

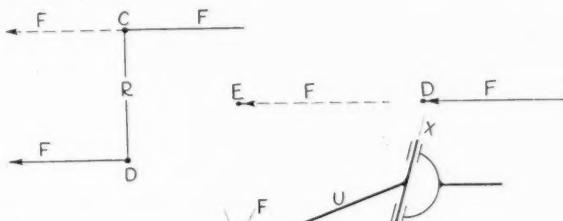


Fig. 5

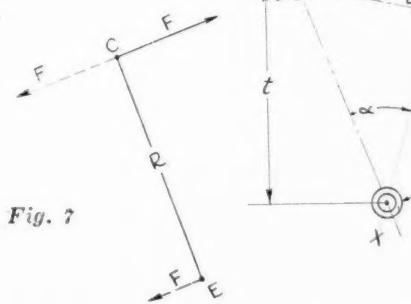


Fig. 6

$F \times B = F \times U \cos \alpha$, but we have a couple $F \times R$ yet to deal with. This couple acts in a plane $v-v$ (perpendicular to the paper), which plane is pierced by axis $x-x$ (the knuckle pin) at an angle α . In a case like this, the couple $F \times R$ can be resolved into two component couples, one of which has an axis $x-x$ and

the other one an axis perpendicular to it, that is parallel with B or, we may say, coinciding with B , for another rule is to the effect that couples can be shifted all over the space provided their axes retain their original direction. The value of the couple around $x-x$ is $F \times R \times \sin \alpha$ and it tends to rotate in the opposite direction to $F \times B$. If $F \times B$ is equal to $F \times R \times \sin \alpha$, then the turning effect of the force at the wheel bearing is nullified and there will be no tendency to rotate the wheel under the influence of the ground resistance.

That this is so is evident by noting that $U/R = \tan \alpha$, and $B/U = \cos \alpha$. Then

$$\begin{aligned} F \times B &= F \times U \cos \alpha \\ &= F \times R \sin \alpha / \cos \alpha \times \cos \alpha \\ &= F \times R \times \sin \alpha \end{aligned}$$

There remains the other component couple, $F \times R \times \cos \alpha$ which is the couple that tends to rotate the wheel and which must be equal to $Q \times a$ in order to move the wheel over the obstacle. $R \times \cos \alpha$ is, of course, the projected length of R in the side view, perpendicular to F .

An additional couple $C \times c$ caused by the brake action cannot alter the balance around $x-x$ either, for to overcome $C \times c$ we need an additional push at the radius rod only, called K , with the provision that $K \times R \times \cos \alpha = C \times c$. Then $C \times c$ is automatically eliminated by the wheel itself, and $K \times R \times \sin \alpha$ only remains, which is used for nullifying $K \times B$. By removing the obstacle D and assuming that the wheels are locked, the maximum push at the radius rod is limited to the maximum frictional resistance at the ground contact. Calling this force S , the turning moment again is counteracted by $S \times R \times \sin \alpha$ while $S \times R \times \cos \alpha$ is opposing the braking torque $C \times c$. In case of locked wheels $C \times c$ is in excess of $S \times R \times \cos \alpha$ but the surplus being a "passive" torque only, it cannot produce motion.

In case of front-wheel drive the driving torque is an active torque and then if the knuckle pin is inclined there is an unopposed turning moment equal to the driving torque times $\sin \alpha$, which must be counteracted by the steering mechanism in order to keep the vehicle on a straight course.

Torsional Strength of Axles

(Continued from page 121)

reached its elastic limit under a torque of 23,000 lb.-in., corresponding to an elastic limit in torsion of 79,300 lb. p. sq. in., and failed under a torque of 38,650 lb.-in., corresponding to an apparent ultimate strength in torsion of 133,000 lb. p. sq. in.

A shaft No. 56,450, from production, reached its elastic limit in torsion (82,300 lb. p. sq. in.) at a torque of 27,000 lb.-in. and failed under a torque of 42,300 lb.-in., corresponding to an apparent ultimate strength in torsion of 129,000 lb. p. sq. in.

A shaft No. 63,430, from production, reached its elastic limit (81,400 lb. p. sq. in.) under a torsional moment of 17,500 lb.-in. and failed under a torsional moment of 24,830 lb.-in., corresponding to an apparent ultimate strength in torsion of 115,000 lb. p. sq. in.

The average elastic limit in torsion of all the samples for which data were obtained was 82,300 lb. p. sq. in. and the average apparent ultimate strength in torsion, 127,000 lb. p. sq. in.

Nitriding Process is Now Employed to Harden Automobile Parts

Durable and non-rusting surface obtained by use of ammonia gas current found advantageous as applied to valve tappets, pump shafts, crankshafts, etc.

AFTER extensive development work on the nitriding process, which was introduced in this country by the Ludlum Steel Co. about two years ago, it is now being employed in the practical production of certain automobile parts. Nitriding, it may be recalled, consists in forming a hard surface layer or case on parts made of steel of a special composition, by subjecting these parts to a current of ammonia gas while at a comparatively high temperature. The steel used contains a certain amount of aluminum and other alloying elements, and the result of the interaction of the ammonia gas with the metallic elements is to form metallic nitrides which are of extreme hardness.

Among the automobile parts to which the process is now being applied are pump shafts and valve tappets. Pump shafts in the past have given considerable trouble from corrosion and wear, with resulting leakage at the bearings. In recent years attempts have been made to solve the problem by means of chromium plating of the shafts, but it is understood that in some cases at least the results have not been entirely satisfactory. The nitriding process gives an extremely hard surface, and the nitrides formed also serve as protection against rust. In fact, it is claimed by the American sponsors of the process that nitrided steel is more resistant to corrosive influences than many so-called rustless steels.

For automobile production the nitriding process seems to have been accepted most readily in France, where it has been pushed by the steel firm of Aubert & Duval Freres, who hold world rights to it outside of Germany. Several well-known French automobile firms, such as Hispano-Suiza and Citroen, make use of it. Among other parts that are made of the special chrom-

ium-aluminum steel and surface-hardened by the nitriding process may be mentioned ring gears, crankshafts, camshafts, piston pins, valve lifting rollers and steering knuckle pins. The Hispano car which won a match race in this country some time ago had many of its parts nitrided and its success in the event was ascribed to the special material and special hardening process employed in its construction in an article published over the signature of Dr. Leon Guillet, a noted French metallurgist, a short time ago. As to the wearing qualities of parts with nitrided surfaces, it is pointed out that an Hispano-Suiza car driven by M. Aubert of the steel firm referred to in the foregoing still showed tool marks on nitrided parts after having been driven 65,000 miles, while engine tappets after one year's continuous service in bus work showed no measurable wear.

Produces Less Distortion

The chief advantage claimed for nitriding as compared with other surface-hardening processes is that it produces very much less distortion of the parts treated. This is partly due to the fact that the process takes place at a much lower temperature than the case-hardening process (between 900 and 1100 deg. Fahr. as compared with between 1600 and 1650 deg.), and partly due to the fact that the nitriding produces only very slight changes in volume. These changes in volume, moreover, take place according to a definite law, and if the highest degree of accuracy is required they can be allowed for in the preliminary machining.

One feature of a nitrided surface is that it will not lose its hardness when subjected to elevated temperatures as long as these do not reach 750 deg. Fahr. The

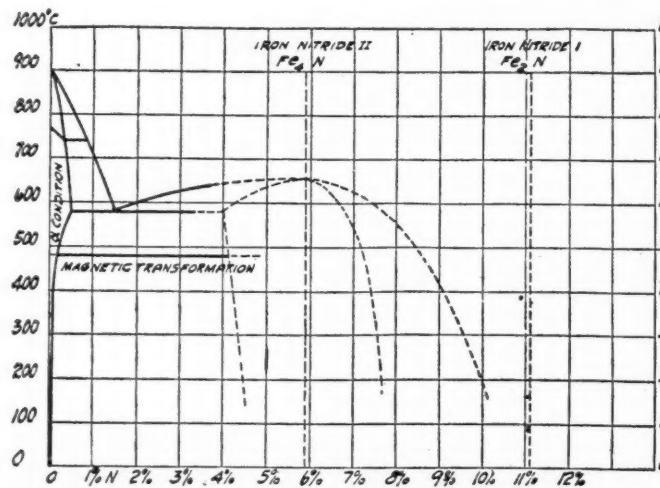


Fig. 1—Iron-nitrogen equilibrium diagram

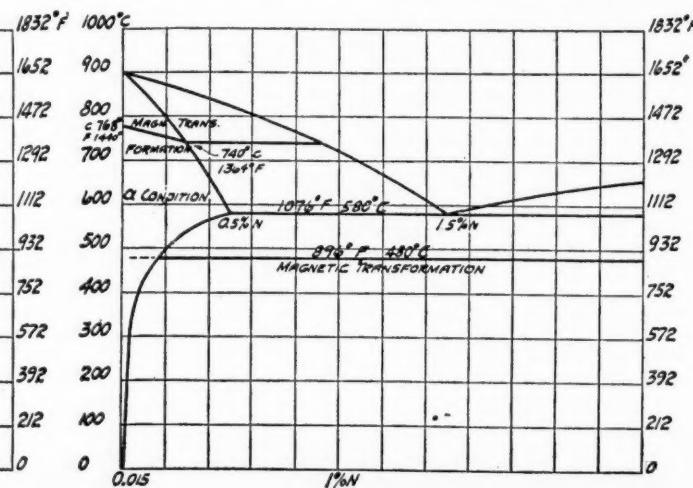


Fig. 2—Lower end of the diagram on an enlarged scale

transition from the hard case to the core of a nitrided piece is a very gradual one. Nitrided surfaces will withstand pressures up to 100,000 lb. p. sq. in. Sharp corners and edges must be eliminated from parts to be hardened by nitriding, as such portions will become extremely hard and are likely to chip. If it is desired to keep certain portions of a part soft, this can be easily accomplished by protecting it against the ammonia gas.

Originated by Dr. Fry

The originator of the nitriding process, Dr. Fry of Essen, Germany, has made an extensive study of the iron-nitrogen equilibrium diagram. It had been shown by Andrew (*Page's Weekly*, Oct. 11, 1912) that it is impossible to obtain a high nitrogen content by melting iron in the presence of nitrogen under pressure. The pressures were carried up to 3000 lb. p. sq. in., yet the nitrogen content did not exceed 0.3 per cent.

Fry found that a much larger nitrogen content is obtainable by diffusion. If powdered iron is heated in a current of ammonia to between 1100 and 1300 deg. Fahr., an iron nitride with as much as 11.1 per cent N is easily obtained. By then heating this iron nitride to various temperatures, certain chemical changes are brought about, and this method was employed by Dr. Fry in evolving his iron-nitrogen equilibrium diagram, Fig. 1.

Decomposition of the iron nitride begins at 824 deg. Fahr., and ceases at 1022 deg. Fahr., at which latter temperature the nitrogen content is 5.6 per cent. Twenty degrees higher, at 1040 deg. Fahr., a strong decomposition sets in again, which diminishes with rising temperature. At 1166 deg. Fahr. another strong decomposition sets in, with the result that at 1200 deg. Fahr. the nitrogen content is reduced to 0.5 per cent and at 1292 deg. Fahr. to 0.11 per cent.

From the above results it is evident that in addition to the original iron nitride Fe_2N with a nitrogen content of about 11.1 per cent, there are two other compounds, one with a nitrogen content of about 5.6 per cent and the other with a nitrogen content of about 0.5 per cent. The former was recognized as Fe_3N , which has a nitrogen content of 5.9 per cent. This latter compound also is a solid solution.

Formation Occurs Quickly

Formation of the two nitrides first mentioned, which are referred to as Nitride I and Nitride II, occurs quickly in a current of ammonia at a temperature slightly above their decomposition points. The decomposition of ammonia into nitrogen and hydrogen begins also at 842 deg. Fahr., from which it appears that the nitriding action is dependent upon the concentration of the gas toward nitrogen, hydrogen and ammonia. The reaction apparently takes place according to the following reversible equations:



From his diagram Dr. Fry determined the following nitriding stages of iron:

1.—Iron nitride I (Fe_2N) saturated with nitride II (Fe_3N) crystals.

2.—Iron nitride II (Fe_3N) saturated with nitride I (Fe_2N) crystals on the outside and ferrite on the inside.

3.—Mixtures of varying concentration of ferrite and nitride II.

4.—Eutectoid of nitride II and ferrite (Braunite).

Dr. Fry prepared a chart showing the different stages of nitriding of a 0.10 per cent carbon steel with

relation to temperature. This diagram showed that the formation of the nitride I skin and of the eutectoid Braunite occurs above 1076 deg. Fahr., while below this temperature a film of nitride I is formed by chemical diffusion, and beneath this film a deep layer of nitride II containing no Braunite. These observations led to the conclusion that a eutectic transformation occurs at about 1076 deg. Fahr. This is of great practical importance as it makes it possible to nitrate iron without the formation of extremely brittle surfaces, by the mere expedient of keeping the temperature below that of the eutectic transformation point, 1076 deg. Fahr.

Iron nitride formed in carbon steel showed an insufficient increase in hardness to be of practical use, and in consequence experiments were made with steels containing alloying elements that form hard nitrides, such as chromium and titanium. Various alloys and elements in the powdered form were nitrided the same as the iron, and the products subjected to heat. Based on the results of these tests, various alloy steels were nitrided, and it was found that for the low alloyed steels the same conditions prevail as in the FeN system. Of particular importance was the discovery that the eutectic transformation of these alloyed steels takes place at about the same temperature as that of iron, viz. 1076 deg. Fahr.

Subsequent experiments by Dr. Fry resulted in the development of certain alloy steels specially suited for treatment by this process. Great surface hardness can be imparted to these steels, and excellent physical properties in the core can be obtained by suitable heat treatment prior to nitriding.

German Handbook

THE publishers Deutsche Verlagswerke Strauss, Vetter & Co., Berlin C2, and Dr. Ernst Valentin Verlag, Berlin SW 11, have produced in conjunction with the German Association of Automobile Makers three manuals giving very detailed technical statistics of automobiles, trucks, motorcycles and stock parts made by their members.

The first volume describes passenger cars, the second, trucks, buses, commercial cars, tractors and motor ploughs, and the third contains on a slightly curtailed scale both the foregoing in addition to German motor cycles and some stock parts. Volume I and II each cost 2.50 marks and volume III 4.40 marks including postage.

ACCORDING to a report of its activities during the 1926-7 fiscal year by the Soviet Commission on Concessions in Berlin, two contracts concerning engineering assistance in the automotive field were concluded with German firms during the year. One is with the Deutz Gas Engine Works and relates to technical assistance to be given to the Moscow machinery trust; it was signed on Nov. 1, 1926, and is to run for a period of seven years. The other is with the Bavarian Motor Works, manufacturers of motorcycles and airplane engines, which are to render technical assistance to the Russian Government aircraft monopoly. It was signed Oct. 14, 1927, and will run for five years.

THE city of Wiesbaden, Germany, a well-known fashionable resort with a population of more than 100,000, has decided to abandon its street railway lines and use motor buses instead after April 1, 1929.

AUTOMOTIVE NEWS SECTION INDUSTRIES

Philadelphia, Pennsylvania

July 28, 1928

Factory Operations Steady With Brisk New Car Sales

PHILADELPHIA, July 28—Response by automobile buyers to the new car offerings of leading manufacturers has stimulated retail buying to a point considerably above the normal seasonal movement and gives indication of making the present summer the most active summer selling period in recent years. Though the new cars are the center of interest there continues to be a good selling movement in many of the cars of earlier introduction, the low price cars in particular showing only seasonal reduction from the earlier year.

Maintenance of price as reflected in the new car offerings gives indication of the strength of car demand and the intention of manufacturers to base sales effort entirely upon improvements and refinements. Sales experience in the first half of the year showed that price had only minor part in determining buyer selection, some of the largest gains being scored by companies whose cars were priced to permit of including special engineering and refinement features.

The July output of factories in the United States will be considerably under the June total of 396,714, this being due not so much to a sharp let-up in sales as to inventory periods at many leading factories. This will aid further in bringing dealer stocks, already at a low seasonal level, to a point warranting extensive manufacturing operations through the summer.

Hudson Operating New Lacquering Equipment

DETROIT, July 23—Use of black enamel on Hudson cars has been discontinued with the opening of a new \$1,000,000 lacquer application plant. The new unit has three overhead systems 3000 ft. long and on these conveyors the parts are hung and carried in their route through three different spraying and baking operations. Besides these conveyors there are two other conveyors 1000 ft. long and 2000 ft. long which carry the completed parts to the car assembly lines.

There are approximately 16 miles of pipes to carry the lacquers from the mixing rooms on the roof of the various spraying booths. In these booths each operator has within reach spray guns for 16 different colors which are now in current production.

Whippet Prices Advanced

TOLEDO, July 23—Willys-Overland Co. has increased prices on two Whippet four models, the coupe cabriolet being priced now at \$595 as against \$545, and the five-passenger sedan at \$610 against \$585. The Whippet six five-passenger sedan has been increased from \$745 to \$770.

M. & A.M.A. Index Shows June Decline

NEW YORK, July 24—In keeping with the usual seasonal trend, shipments of accessories, parts and equipment during June showed a recession from May, but in general were far ahead of June of last year, according to the monthly statistics compiled by the Motor & Accessory Manufacturers Association. Grand index for all groups for the month is 190 compared with 201 for May and 169 for June, 1927.

Index for original equipment declined to 200 from 215 for May and compares with 176 for June of 1927. This decline is to be expected in view of the usual summer let-up in car production and the changes in models being made by a number of car manufacturers. Replacement parts show an index for June of 150 as compared with 183 for May and 130 for June of last year.

Shipment of service equipment continues below last year's levels generally and registered 140 for June of this year as compared with 157 for May and 171 for June, 1927. Accessories also continue to be comparatively weak, their index for the month being 110 as compared with 113 for May and 132 for June a year ago.

General Motors Contracts for \$400,000,000 Insurance

NEW YORK, July 25—General Motors Corp. has signed a contract with the Metropolitan Life Insurance Co. for a group life insurance policy for its employees amounting to nearly \$400,000,000. The policy allows all General Motors employees of three months' service or more to take \$2,000 in life insurance without physical examination at a cost of \$1.50 a month.

Howard C. Bailey

NEW YORK, July 25—Howard C. Bailey, advertising manager for International Motor Co., died yesterday after an illness of a week and a half. Funeral services were to be held Friday.

Piston Displacement to Remain Unchanged

WASHINGTON, July 23—The piston displacement for engines in the annual 500-mile Indianapolis race will be the same in 1929 as effective since 1926, the directors and stockholders of the Indianapolis Motor Speedway Corp. deciding to forego the usual third year change. This action was taken because of the feeling that displacement was as low as was practical for the present and that the industry could not profit by a change to a smaller engine. The question of barring superchargers was not discussed and there will be no change at least for the 1929 race.

Deposits in Dodge Deal Extended Until July 28

NEW YORK, July 25—The time for deposit of stock of Dodge Brothers, Inc., under the plan for the merging of that company with the Chrysler Corp. has been extended to midnight July 28. The deposits up to and including the close of business July 23, amounted to 721,629 shares of preference stock or 86.1 per cent of the outstanding amount; 1,457,204 shares or 79.6 per cent of the Class A stock, and 484,500 shares or 96.9 per cent of the Class B stock.

P. A. Meeting August 7

BUFFALO, July 25—The stockholders' meeting of the Pierce-Arrow Motor Car Co., called for today to act on the proposed affiliation with the Studebaker Corp. of America, was postponed until Aug. 7 because a sufficient number of proxies had not been received.

Pierce-Arrow Loss \$634,000

NEW YORK, July 24—Pierce-Arrow Motor Car Co. reports net loss of approximately \$274,000 for the quarter ended June 30 after all charges. This compares with net loss of \$359,763 set up in the previous quarter this year and contrasts with a net income of \$71,608 in the June quarter last year. Net loss in the first half, this year, approximated \$634,000 against net income of \$115,383 in the same period last year.

Olds July Schedule 10,000

LANSING, July 21—Olds Motor Works will produce between 9500 and 10,000 cars in July, according to factory officials. August production will be low due to vacation closing.

Raskob Leaves G.M. to Direct Campaign

Acts to Gain Time for Political Work and to Establish Company Position

NEW YORK, July 24—John J. Raskob resigned today as chairman of the finance committee of General Motors Corp., as a member of that committee and as a member of the executive committee, to give his entire attention to the chairmanship of the Democratic National Committee. He continues his place as a vice-president and director of the corporation. No appointment of a successor was announced but it was understood that Donaldson Brown, vice-president in charge of finance and a member of both committees, would take over Mr. Raskob's duties for the present.

In offering his resignation to A. P. Sloan, Jr., president, Mr. Raskob said in part: "I find that the duties imposed upon me as chairman of the National Democratic Committee are such as to take all my time and effort during the ensuing presidential campaign. Moreover, it is desirable for the public to know, as everybody in General Motors should appreciate, that the corporation is not, and in the nature of things cannot be, in politics."

In accepting the resignation, Mr. Sloan said: "In view of your conviction that your duty as chairman of the National Democratic Committee will monopolize your time during the presidential campaign and on account of the importance to the corporation as well as to yourself of making it unmistakably clear that the corporation takes no part in political affairs, we are constrained to accept your request to be relieved from all your duties in connection with the corporation. It is the unanimously expressed hope and expectation that you will resume your duties after the presidential campaign is over."

Goodrich Rubber Reports \$1,574,889 Loss in Half

NEW YORK, July 25—B. F. Goodrich Co. reports a net loss of \$1,574,889 for the half year ending June 30, as compared to a net profit of \$5,813,501 for the same period last year. Net sales were \$70,624,878 against \$69,274,347. The loss was caused by the decline in the price of crude rubber. There was a much larger increase in the sales volume than indicated in the figures, as tire prices were substantially lower in the 1928 period.

Caterpillar Tractor Co. showed a net profit of \$2,811,664 for the quarter ended June 30, after depreciation, but before Federal taxes. Net profit for the half-year period was \$4,292,897 before Federal taxes, compared with \$3,382,139 for the same period last year.

Net earnings of the Fedders Mfg. Co., Buffalo, for the six months ended June 30, were \$298,673, compared with \$150,000 for the entire year 1927.

Stewart-Warner Speedometer Corp. reports for the quarter ended June 30, net profit of \$2,226,050, comparing with \$1,387,284 in the preceding quarter, and \$1,508,878 in the second quarter of 1927.

Wright Expansion to Cost \$3,500,000

NEW YORK, July 21—Ambitious plans for expansion, involving an expenditure of \$3,500,000 and increasing the floor space over five times, necessitated by the enormous growth of business during the past few months, were revealed at a special meeting this week of officials of the Wright Aeronautical Corp. Part of the program of expansion which would increase the floor space from 90,000 sq. ft. to over 500,000 sq. ft. is under way, and one unit, involving 60,000 sq. ft. is now being used for assembly.

Further plans involve the erection of a modern foundry on a portion of the land recently purchased from the American Locomotive Co., to replace the temporary foundries now in use. A large wing has been added to the original plant and will be available for use in a few months, with further wings to be added.

Bunting Adds Equipment to Double Production

TOLEDO, July 25—The foundry of the Bunting Brass & Foundry Co. is being redesigned and new furnace equipment and metal-handling devices, by which an exact control of analysis and of the physical properties of metal can be automatically achieved, is being installed. The new equipment will make possible low cost, big volume production of bearings. Productive capacity of foundry, machine shop, and practically every department in the Bunting plant is being more than doubled.

Brockway to Add Equipment

BINGHAMTON, N. Y., July 24—Increased sales by Brockway Motor Truck Corp. have resulted in the development of plans for two assembly lines, so that the plant can turn out a complete vehicle every 20 minutes, according to announcement by George A. Brockway, president. The July output is expected to be close to 500 trucks.

Moon Adds Broughams

ST. LOUIS, July 23—Moon Motor Car Co. has added a four-passenger Victoria brougham to its 6-72 and 8-80 models, the former listing at \$1,695 and the latter at \$2,195.

Lathers Leaves Ford

DETROIT, July 24—Charles T. Lathers, a veteran in the sales division of Ford Motor Co., has resigned. No successor has been appointed.

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for AUTOMOTIVE INDUSTRIES.

NEW YORK, July 26—Regardless of conditions in other presidential years, it is becoming more and more apparent that the campaign of this year is unlikely to cause any unsettlement in trade and industry. Business in general continues to follow a normal course and there have been many developments during the past week of an optimistic nature.

FISHER'S INDEX

Fisher's index of wholesale prices was 99.9 last week, reaching a new high for the year.

FREIGHT CAR LOADINGS

Miscellaneous freight loading for the week ended July 7, 1928, shows a decrease of 152,444 cars, compared with the preceding week. This sharp decline was due to the holiday. However, the total for this period is 11,500 cars above the corresponding period a year ago, though a decrease of 46,951 cars from two years ago.

BUILDING CONSTRUCTION

Building continues in harmony with its newly established record for the first half of the year; the contemplated new work reported in June is 41 per cent in excess of the June, 1927, record.

BANK DEBITS

The stock market has endured a dull week, with prices irregular and call money ranging between 5 and 6½ per cent. Bank debits to individual accounts outside of New York City were 2 per cent higher for the week ended July 18 than for the corresponding period in 1927. This gives a decline in the percentage increase of 8 per cent since the week ended July 11.

FEDERAL RESERVE REPORT

Following the advance of the rediscount rate of the Federal Reserve banks of Chicago, New York, Richmond and Atlanta, the Boston and St. Louis Federal Reserve banks have also raised their rates. Loans by the Federal Reserve banks to member banks decreased \$77,511,000 during the week ended July 18. A considerable portion of this decrease took place with the New York Federal Reserve Bank. Likewise, the reserve ratio in New York City increased to 73.7 per cent, whereas the ratio for all the reserve banks increased only to 69.5 per cent.

The report of member bank loans seem to confirm the above inference that the majority of funds for brokers' loans in New York City is coming from outside. Although the member bank loans declined during the stock liquidation in June, they rose again to new high levels early in July. These loans declined \$87,000,000, following a decrease of \$252,000,000 a week earlier. Brokers' loans decreased \$49,000,000 and net demand deposits have decreased \$148,000,000.

June Output Shows Large Gain Over '27

Total of 425,113 in United States and Canada Compares With 341,154

WASHINGTON, July 23—June production of cars and trucks in the United States and Canada totaled 425,113, according to figures by the Department of Commerce. This compares with the revised May total of 460,138 and with 341,154 in June last year. For the first six months the total is brought to 2,326,877 as against 2,195,155 in the first half of 1927.

The June car total in the United States was 356,439 against 375,863 in May and 278,729 in June last year. The June truck total in the United States was 40,275 against 50,233 in May and 43,238 in June last year. Canadian car production in June totaled 25,341, comparing with 29,764 in May and with 16,470 in June last year. Truck production in Canada in June totaled 3038 as against 4178 in May and 2738 in June last year.

Car production in the United States in the first half totaled 1,965,727 as against 1,802,620 in the first half last year. Truck production in the United States in the half totaled 236,153 as against 266,354 in the 1927 first half. Canadian car production in the half totaled 107,874 as against 105,011 and truck production totaled 17,123 against 21,170.

Wholesale Car Prices Show Increase in June

WASHINGTON, July 26—Wholesale prices of automobiles showed a slight increase in average for the whole industry during June over May and a sizeable increase over June, 1927, according to the June bulletin on wholesale prices of commodities issued by the Department of Labor's bureau of labor statistics.

Rubber continued its steady descent until automobile tires this June were shown to be costing only 62.2 per cent of what they cost in 1926.

Taking the average prices of commodities in the year 1926 as the key basis of 100 points, the composite prices of automobiles in June, 1927, were 102.9; in May, 1928, 104.7, and in June, 1928, 105.1. Using the same system for automobile tires the composite prices of tires at the factories in June, 1927, were 78.3; in May, 1928, 69.8, and in June, 1928, 62.2.

The average price for a balloon tire at the factory in June, 1927, was \$14.045; in May, 1928, \$12.776, and in June, 1928, \$11.384; for a cord tire, in June, 1927, \$10.948; in May, 1928, \$9.784, and in June, 1928, \$8.806; for a fabric tire \$7.199, in June, 1927; \$6.108 in May, 1928, and in June, 1928, \$5.310.

Six Months Output Climbs to 2,326,877

	Cars	Trucks	Total
Jan.	212,281	27,875	240,156
Feb. ...	301,466	34,847	336,313
Mar. ...	387,053	43,804	430,857
Apr. ...	385,394	49,006	434,400
May ...	405,627	54,411	460,038
June ...	381,780	43,333	425,113
<hr/>			<hr/>
Total 2,073,601			2,326,877
<hr/>			
	Cars	Trucks	Total
Jan. ...	211,395	42,907	254,302
Feb. ...	278,997	44,421	323,418
Mar. ...	365,634	52,033	417,667
Apr. ...	377,899	51,449	429,348
May ...	379,139	50,666	429,805
June ...	295,198	45,956	341,154
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Total 1,908,262			2,195,694
July ...	245,585	33,371	279,456
Aug. ...	284,489	36,819	321,308
Sept. ...	235,121	36,519	271,640
Oct. ...	189,177	38,224	227,401
Nov. ...	114,076	25,743	139,819
Dec. ...	108,356	28,626	136,982
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Total 3,085,086			3,572,300

Steel Prices Show Stronger Undertone

Intensive Competition Continues on Some Products—Foundries Active

NEW YORK, July 26—About the only effect which announcement of a \$2 per ton advance in the fourth quarter price of hot-rolled steel bars has had so far is that the undertone of the market for cold-finished steel bars has turned stronger. The latter quoted at 2.10 cents, Pittsburgh, have sold for some time at a price that allows only \$5 per ton conversion margin in a 1.85 cents hot-rolled bar market, compared with \$10 during most of 1926 and a minimum of \$6 last year.

Consumers do not interpret announcement of a higher price for fourth quarter as necessarily indicating that the steel market is stiffening, but merely as clarifying the position of the larger producers who want to set a good example to the smaller mills, but who are dependent upon ratification of their prices by the demand.

With the exception of full-finished automobile sheets, which continue firm at 4.00 cents, Pittsburgh, the sheet markets can hardly be said to have turned stronger. It is not uncommon to hear of sales of black sheets at 2.65 cents, Pittsburgh. Intensive competition continues in the market for hot-rolled strip steel as well as between strip and sheet mills. The market for blue annealed sheets is easy at 2.00 cents, Pittsburgh, because of the competition of strip mills, supplying corresponding widths. Plate mills also face the competition of strip producers to some extent. Cold-rolled strips also show an easy tone.

Pig Iron—Automotive foundries continue to call for fairly heavy tonnages of iron on account of previously concluded contracts, but fresh business is light. The market is marking time, with blast furnaces as well as melters optimistic regarding the outlook for business.

Aluminum—There are no new developments in the primary aluminum market, seasonal routine conditions featuring the movement. Remelted metal is in fair demand, with the market rather easy.

Copper—Consumers confine their buying to small lots for prompt and August shipment. The major market is having a period of rest, with prices maintained at previous levels. Demand for automotive brasses continues fair.

Tin—Slowly the market seems to be retracing its course and headed toward slightly higher levels. Consumers are buying only what they need, but there is more confidence in evidence that the lowest prices have been left behind.

Lead—Better demand from storage battery manufacturers is noted. The market is steady at unchanged price levels.

Zinc—With the price of zinc ore at \$40 @ \$41, smelters maintain that the prevailing price of 6.20 cents, East St. Louis, represents the irreducible minimum for slab zinc. The market is quiet.

Barbados Tax Gasoline

WASHINGTON, July 26—Advices from Barbados, British West Indies, to the Department of Commerce announce placement of a gasoline tax of 6 cents per gallon, as a result of an act of the Barbados House of Assembly, which now makes gasoline retail in the islands at a total of about 47 cents U. S. currency, including the tax.

Regulations to Aid Reclaiming of Cars

Treasury Department Issues
Instructions to Dealers and
Finance Companies

WASHINGTON, July 23—Acting Secretary Ogden L. Mills of the Treasury Department has issued complete instructions as to the method to be employed by finance companies and dealers who own cars that have been confiscated because of violation of the Eighteenth Amendment, or the revenue laws, in reclaiming their property. In cases where the cars have been sold, it will be possible for the owner to recover the proceeds of the sale, with some exceptions.

Petitions for remission or mitigation of forfeiture should be filed with the Prohibition Administrator, or the Collector of Internal Revenue of the district in which the property is detained, or has been sold.

"It should be addressed to the Secretary of the Treasury and executed under oath by the person, firm or corporation presenting the claim. It should state in clear and concise terms the interest of the petitioner in the property to be forfeited, or which has been forfeited and sold and the facts relied upon to show that the forfeiture was incurred without willful negligence or without any intention of the petitioner to defraud the revenue or violate the law, or such other mitigating circumstances as would justify the remission of the forfeiture. In the event the petition is filed for the restoration of the proceeds of sale, it should also contain satisfactory proof that the petitioner did not know of the seizure prior to the declaration of forfeiture and was in such circumstances as prevented him from knowing of the same."

Accurate data, including description of property and facts of the seizure, should accompany applications, and all contracts, bills of sale, chattel mortgages, affidavits, claims for freight, and all similar documents that might facilitate the identification of the vehicle.

The Commissioner of Prohibition or the Internal Revenue Commissioner will recommend the final action to be taken by the Secretary of the Treasury, after reviewing the facts of the case as presented by the collectors or administrators with the United States attorneys and marshals.

Marmon Half Exceeds 1927

INDIANAPOLIS, July 23—Shipments by Marmon Motor Car Co. in the first six months this year were 15 per cent larger than the total for all of 1927. Orders on hand insure a continuance of record activity through the summer. Dealer stocks throughout the country show an average of four cars per dealer.

1928 World Production 4,838,725 Estimated by Commerce Department

WASHINGTON, July 26—Automobile production throughout the world during 1928 will total 4,838,725 passenger cars, trucks and buses, according to an estimate made by the automotive division of the Department of Commerce. Of this total it is estimated that manufacturers in the United States will manufacture 4,000,000 vehicles, or 83 per cent. Following is the department's estimate of the 1928 production:

	Passenger Cars	Trucks and Buses	Total
United States .....	....	....	4,000,000
Canada .....	....	....	200,000
Austria	7,500	4,000	11,500
Belgium .....	....	....	8,150
Czechoslovakia	11,900	3,460	15,360
Denmark .....	....	....	200
England .....	....	....	250,000
France .....	....	....	200,000
Germany	70,000	21,000	91,000
Hungary	400	460	860
Italy .....	....	....	55,000
Spain	275	400	675
Sweden	1,500	500	2,000
Switzerland .....	....	....	1,600
Japan	25	225	250
Russia	1,880	250	2,130
Estimated total			4,838,725

Comparing the 1927 world production, which was 4,152,267 units, the figures show that in 1926 the production was 17½ per cent greater than for last year. Of the total 1927 production the United States contributed 3,394,255 units, or approximately 82 per cent.

Following are the world production figures for 1927, with imports, exports, re-exports and local consumption in each of the automobile manufacturing countries of the world:

	Production	Imports	Exports	Re-ex- ports	Local Con- sumption
United States	3,394,255	635	436,641	29	2,958,220
Canada	179,426	36,630	74,324	438	141,294
Sub-Total	3,573,681	37,265	510,965	467	3,099,514
Austria	8,700	1,939	3,253	*...	7,386
Belgium	6,500	4,567	2,875	*...	8,192
Czechoslovakia	10,200	3,621	932	...	12,889
Denmark	190	4,833	...	1,570	3,453
England	231,920	19,340	17,877	1,054	232,329
France	190,000	5,227	51,983	*...	143,244
Germany	72,000	12,003	4,062	...	79,941
Hungary	282	1,960	13	...	2,229
Italy	54,559	3,830	33,312	...	25,077
Spain	585	†...	...	...	...
Sweden	1,250	17,705	...	...	18,955
Switzerland	1,585	11,360	149	...	12,796
Japan	305	3,895	...	...	4,200
Russia	510	....	...	...	510
Total	4,152,267	127,545	625,421	3,091	3,650,715

* Not available. † Not available first six months, 1927—Imports, 8,555.

Comparing world automobile production and consumption during 1925, 1926 and 1927, the department's figures are as follows:

	1925	1926	1927
World total	Number	4,892,671	4,032,692
Increase, or decrease(—).....	Per cent	....	2.9
American manufacture (U. S. and Canada)	Per cent	90.5	89.5
Consumption:			
World total	Number	4,892,671	5,032,692
Increase in registrations	Number	3,133,278	3,004,960
Replacements	Number	1,759,393	2,027,732
4,152,267			
2,093,091			
2,059,176			

Men of the Industry and What They Are Doing

Moskovics Vice-President of Parts Making Company

Faries Mfg. Co. formed in 1886 and in recent years extensive manufacturer of brass, bronze and aluminum castings, has been reorganized with F. E. Moskovics, president of Stutz Motor Car Co. of America, as vice-president, and Herold C. Strotz, Chicago manager of F. B. Keech Co., a director. W. J. Grady continues as president and treasurer of the company, and with his associates has taken over the Faries original interests. The Fairies concern has been manufacturing an oil rectifier, which is standard equipment on the Stutz, from design and invention of Col. William G. Wall.

Industry Backs McLaughlin

James C. McLaughlin, member of the ways and means committee of the House of Representatives, who was a leader in the fight for removal of the excise tax from the sale of automobiles, is running for reelection this fall. The leaders of the motor industry in Michigan are encouraging support of his candidacy, not only on account of his championing of their cause but because of his long standing service in the Congress, and because they are convinced of his ability and judgment in the making of laws for this country.

Walton to Visit Plants

Leslie Walton, chairman of the board and joint managing director of Vauxhall Motors, Ltd., England, is on his way to Batavia, Java, where he plans to visit N. V. General Motors Java. Thence he will proceed to Melbourne, Australia, where he will visit General Motors (Australia) Pty., Ltd., and its assembly plants at Adelaide, Brisbane, Perth and Sidney. From Australia he will go to Wellington, New Zealand, and visit General Motors New Zealand Ltd.

Anderson Vice-President

Roy F. Anderson has been promoted to vice-president in charge of engineering of the Hayes Body Corp. Mr. Anderson has served 10 years with the Hayes corporation, rising to chief engineer, which position he vacates to take over his new duties. He is active in the body division of the Society of Automobile Engineers.

Brockway Aids Memorial

George A. Brockway, president of the Brockway Motor Truck Corp., Cortland, N.Y., has given a total of \$60,000 for construction of a nurses' home. The gift was made in two parts of equal size. The nurses' home is to be erected as a memorial in honor of Cortland men who served during the World War.

Col. Charles Clifton

NEW YORK, July 23—Directors of the National Automobile Chamber of Commerce, at their meeting in South Bend last week, adopted the following resolution in memory of the late Col. Charles Clifton:

"Whereas, Colonel Charles Clifton was for nearly a quarter of a century President of this organization and its predecessors, and

"Whereas, he was the leader of the automobile industry from its experimental stages until it became the largest industry in the world, and

"Whereas, he carried on this leadership without challenge, without adverse comment, with far-sighted judgment and with distinguished fairness, and

"Whereas, his leadership made the National Automobile Chamber of Commerce a leading exponent of that which is best in the work of trade organizations, pursuing its course with benefit to its members, but always with recognition that this must be done in the light of public service, and

"Whereas, he was always a beacon light guiding the industry by the high standards which he observed, therefore

"Be it Resolved: That we, the Directors of the National Automobile Chamber of Commerce hereby record our respect and devotion to the memory of Charles Clifton, whose good will and fairmindedness amid difficult situations, whose adherence to the highest ethics, provide an inspiration and example for the industry for the years that are to come."

Fuller to Address Salesmen

Governor Alvan T. Fuller of Massachusetts has accepted an invitation to be one of the principal speakers at the annual convention of master salesmen of the Packard Motor Car Co., at Detroit, July 30, 31 and Aug. 1.

Ford Joins D'Arcy

Harry Ford, who has been connected with several leading automobile manufacturing companies in the past six years as publicity man, has joined the D'Arcy News Bureau, St. Louis.

Nichols Stearns Treasurer

H. W. Nichols has been appointed treasurer of the F. B. Stearns Co., succeeding R. K. Brinley, who died July 16. J. H. Fitzgerald was named assistant treasurer and assistant secretary.

Porter on Bank Board

Drury L. Porter, vice-president and treasurer of the Motor Wheel Corp., has been elected a director of the Capitol National Bank, Lansing.

Graham-Paige Executives Confer with Branch Heads

Managers of the 12 factory branches of Graham-Paige Motors Corp., spent the week of July 21 in Detroit and at Mackinac Island conferring with the officers and executives of the company. Robert C. Graham, vice-president, and F. R. Valpey, general sales manager, opened the convention Monday, after which the delegation went to the Graham-Paige body plant at Wayne for luncheon and an inspection of the new plant. In the afternoon, three trapshooting teams competed at the Graham-Paige gun club grounds, Wayne, the Central States team defeating the East and the West. Harold Miller, of Evansville, won the high gun trophy, and J. D. Berry, Atlanta, took the prize for the best string.

Conferences with department heads and an inspection of the main plant occupied the managers Tuesday, after which they left for Mackinac Island, where the remainder of the program, discussions of the plans and policies of the factory and branches took place, ending Saturday.

The following general managers of branches were present:

John D. Berry, Atlanta; R. A. Green, Boston; W. A. Hall, Cleveland; W. O. Wilson, Dallas; J. M. O'Dea, Detroit; Harold Miller, Evansville; W. E. Stalnaker, Indianapolis; J. M. Sterling, Los Angeles; J. H. Mackie, Minneapolis; S. C. Hanna, Omaha; Owen McCusker, San Francisco; Milo D. Herron, Washington.

Factory officials and executives who accompanied the managers to Mackinac Island were:

Robert C. Graham, vice-president; F. R. Valpey, general sales manager; R. C. Hicks, assistant treasurer; F. F. Kishline, assistant chief engineer; W. R. Heilman, assistant general sales manager; G. W. Cushing, manager of advertising; R. W. Baskett, manager of districts; E. G. Payton, distribution manager; A. Krueger, Canadian sales manager; W. O. Lampe, statistician; E. W. Lothrop, manager of systems.

John D. Biggers, vice-president of Graham-Paige International Corp., New York, and Ralph H. Austin, national business manager, New York, accompanied the party to Mackinac Island.

Dump Truck Bids Sought

HARRISBURG, PA., July 23—The Pennsylvania Department of Highways will open bids on Aug. 7 for supplying the department with four-wheel-drive dump trucks. The bidding is to be on eight 5-ton trucks with power take-off for operating snow plows; eight 5-ton trucks without power take-off, and 68 3-ton trucks.

Increased Earnings Shown by Industry

Car-Parts Companies Reports for First Half Indicate General Gains

DETROIT, July 21—For the quarter ended June 30, Hudson Motor Car Co. reports earnings of \$5,008,949, after depreciation, Federal taxes and other charges. This is equal to \$3.14 a share on 1,596,660 shares against \$5,791,048 or \$3.62 a share after above charges earned in the corresponding quarter of 1927.

For six months, net income totaled \$9,216,321, equal to \$5.77 a share against \$9,817,563 or \$6.14 a share in the first six months of last year.

Reo Net for Half \$3,018,144

DETROIT, July 21—Net profit of Reo Motor Car Co. for the second quarter was \$3,104,633. This is slightly more than \$1.50 a share on the 2,000,000 shares of Reo common stock. Net loss of \$86,489 was registered in the first quarter of the year, making net earnings for the first six months of the year \$3,018,144. Capital and surplus totaled \$31,407,815.92. Cash on hand and in banks is listed as \$17,250,175. Assets total \$37,902,744, of which machinery and equipment make up almost \$12,000,000 of the physical assets.

Gabriel Earnings \$275,210

CLEVELAND, July 23—The financial report of the Gabriel Snubber Mfg. Co. for the first six months of 1928, made public today, shows net profits for the six months of \$275,210. Of this total, \$184,194 represents the company's earnings for the second quarter of this year, or slightly more than twice the profits for the first three months of 1928. The balance sheet of the company as of June 30, 1928, shows current assets of \$2,197,302, including \$1,426,537 of Liberty bonds, and current liabilities of \$288,383.

George H. Ralls, president, said rapid progress is being made on important changes in the plant necessary to take advantage of new developments growing out of research and experimental work which has been in progress for some time. No announcement of the nature of these developments has been made by the Gabriel company.

Transue-Williams Net \$196,081

ALLIANCE, OHIO, July 21—The Transue-Williams Co. showed a profit of \$196,081 for the first half of 1928, this comparing with a loss of \$87,595 the first half of 1927. Before Federal tax was deducted, profit for the first quarter of the year was \$132,534.

Bohn Earnings \$1,644,089

DETROIT, July 21—Bohn Aluminum & Brass Corp. for six months ended

June 30, 1928, reports net profits of \$1,644,089, after all charges including Federal taxes, equivalent to \$4.70 a share earned on 350,000 shares of no par capital stock outstanding. This compares with net earnings of \$603,163, or \$1.73 a share on 349,011 shares for first six months of 1927, and with net earnings of \$1,181,606, or \$3.38 a share on 349,361 shares for entire year of 1927.

Motor Products Net \$1,168,020

DETROIT, July 21—For the six months ended June 30, Motor Products Corp. reports net profits of \$1,168,020 after interest, depreciation, Federal taxes, etc. This is equal after allowing for dividend requirements on 30,164 shares of \$5 preferred to \$8.36 a share earned on 130,406 no par common shares.

Commercial Credit Net \$351,825

NEW YORK, July 25—Commercial Credit Corp. reports net profit for the first half of 1928 after all charges as \$351,825 as compared with \$358,067 for the similar period of 1927. Motor lien retail time sales notes as of June 30 amounted to \$17,371,726 as compared with \$19,326,541 for the previous year. Of this amount only \$23,777 was past two months overdue as compared with \$49,203 a year ago. Unused credit lines with depository banks amounted to \$7,449,000.

General Electric Net \$25,675,307

NEW YORK, July 27—General Electric Co. reports net profit available for dividends for the first half of the current year as \$25,675,307 as compared with \$23,830,162 for the corresponding period a year ago.

L. A. Young Earnings \$1,208,906

DETROIT, July 23—Net profits of the L. A. Young Spring & Wire Corp. for the first six months of the year totaled \$1,208,906 against \$758,080 in the 1927 period. Both are before Federal tax provisions but after all other charges. Profit in the half after Federal charges will be equivalent to \$3.80 a share earned on the 260,832 shares of common stock outstanding.

C. I. T. Net Profit \$2,246,590

NEW YORK, July 23—Commercial Investment Trust Corp. reports net profits of \$2,246,590 after all charges, in the first six months of 1928, equivalent after preferred dividends to \$4.14 a share on common stock. This compares with \$1,288,353, or \$1.95 a share on common, in the first six months last year.

Hayes Body Earnings \$1,005,272

DETROIT, July 23—Hayes Body Corp. reports net earnings of \$1,005,272 after all charges but before Federal taxes in the first six months this year. After setting up reserves of \$137,000 and deducting \$75,400 for write-offs on operations of previous years, there remained a profit of \$792,832 before taxes.

Financial Notes

Evans Auto Loading Co. stockholders will meet Aug. 1 in Detroit to vote on the directors' proposal to increase the authorized capitalization from \$700,000 to \$1,000,000. Present authorized capital consists of 40,000 shares of \$5 par class "A" and 100,000 shares of \$5 par class "B." The proposed new capital will consist of 200,000 shares of \$5 par stock. As class "A" has been converted into class "B," leaving the company with outstanding capital of 100,000 shares of class "B," stockholders will be asked to eliminate class distinction.

Edward G. Budd Mfg. Co. has notified stockholders that the quarterly dividend on preferred stock due Aug. 1 will not be paid. The company has \$150,000 maturities in serial bonds for payment Aug. 1 and \$100,000 due on the sinking fund of its convertible 6's payable Sept. 1. The company also will need to finance inventories in connection with increased orders.

C. G. Spring & Bumper Co. directors have voted to defer dividends on common stock, because of the advisability of conserving cash to meet heavy production schedules. Volume is expected to show less decline in the summer and fall than usual.

Studebaker Models Bring Sales Increase of 50%

SOUTH BEND, July 23—Paul G. Hoffman, vice-president of the Studebaker Corp. of America, reports the Studebaker and Erskine cars introduced this month have been accorded the most enthusiastic public reception of any models in the history of the company.

"Reports received from Studebaker dealers throughout the country indicate that retail deliveries have gone up from 40 to 50 per cent," said Mr. Hoffman. "The Studebaker Sales Co. of Chicago informed me that the week following the announcement was the largest in its history, both from the standpoint of deliveries and orders. Other enthusiastic reports indicate that our record of 10 consecutive months of sales increases will be changed to 11 months of gains when July sales are completed."

Pontiac Power Increased

DETROIT, July 23—The Pontiac car, now being exhibited in Detroit, shows several detailed improvements. Power has been increased from 43 at 2600 to 48 at 2850 through the adoption of a one-inch Marvel carburetor and an increase from 1 to 1 1/16 in. in port hole diameter. No changes have been made in manifolding but a mushroom type bell-shaped air deflector has been mounted on the carburetor intake. Tire size has been increased from 29 x 4.75 to 29 x 5.00, mounted on 19 in. wheels. Rear axle gear ratio has been decreased from 4.45 to 4.34 to one to enable a higher top speed which is now about 62 to 63 m.p.h. New color combinations also have been adopted.

Automotive Industries
July 28, 1928

Motor & Equipment Association Succeeds A. E. A. and M. & A. M. A.

New Organization is Expected to Begin Functioning About September 1—Election of National Officers and Directors Scheduled For Early Autumn.

CHICAGO, July 21—After two days of formal discussion and a one-day session of informal character, committees representing the Automotive Equipment Association and the Motor & Accessory Manufacturers' Association completed this week the details of the proposed merger of these two national trade bodies, naming the new group the Motor & Equipment Association.

With the consolidation now completed, requiring only the certain ratification of the two bodies' membership, the automotive industry has entered the field of aviation service and supply. With more than 400 manufacturers and 350 points of wholesale distribution completely blanketing the United States and Canada, the new organization will require only market analysis and inventory study to establish a widespread aeronautic service of supply.

As it was planned at the A.E.A. summer convention, the membership will be divided into three groups: manufacturers for original equipment, raw materials, machinery, tools, etc.; manufacturers who distribute through wholesale channels or sell also for original equipment, and wholesalers.

The second of these groups will take the full service of the association in all departments, and correspondingly, will pay the highest dues of the three groups. The first group will add Greater Market Development service to its present services and will pay the second highest dues. These two groups also will exhibit at the national automobile show, thereby considerably enlarging the automotive and shop equipment sections of the shows. The third group will take the full wholesaling service of the association but will dispense with credit service and will pay the lowest dues of the three groups.

Divisions Self Governing

Each of the three divisions will be completely self-governing through a council of nine members who will have absolute control over the affairs of that division. Each nine will select six of its own number, and the 18 thus selected will constitute the board of directors. The board will be responsible for administration and the councilors of each division will not act jointly at any time.

The administration of the new association, in carrying out the decisions of the board of directors and the division councils, will be in the hands of M. L. Heminway of New York as general manager, and B. W. Ruark of Chicago as associate general manager.

Under Mr. Heminway at the New York office will be the administrative

affairs of division A, credit department, market research division, statistical division, national automobile shows, participation and legislative matters. Under Mr. Ruark at Chicago will be the administrative direction of divisions B and C, market development department, the November exhibitions at the Coliseum at Chicago, the annual convention, the finances of divisions B and C and general publicity.

Mr. Heminway as general manager will report to the board of directors. Mr. Ruark as associate general manager, will report directly to the councils of the divisions under his general supervision. The new association will be a voluntary association, unincorporated and not for profit.

Preserve Former Regulations

Under the new federation form, the autonomy of the two merging organizations has been preserved to the fullest extent necessary for the protection of every interest inherent in the two associations prior to the merger. The constitution and by-laws of the Motor & Equipment Association follow in the main the existing by-laws of the two associations prior to their consolidation with only such sectional changes as were necessary to accommodate the new set-up.

The reserve fund of the two associations, upon the ratification of the merger, will be arranged on an equitable basis to provide a general average for the membership as a whole, the members with the largest capital in reserve prior to the merger having their surplus equity over and above the new general average credited to the account and applied to their dues.

Election of the board of directors, election of national officers, and rearrangement of personnel, will take place at the time of the first meeting of the new federated membership in the early autumn. It is contemplated that the Motor & Equipment Association will begin to function as an entity about Sept. 1 and should be in full swing by Labor Day.

Continue Departmental Work

All departmental activities of the two associations prior to the merger will be continued under the new federation, except for elimination of such duplications either of routine or personnel as may be necessary in the interest of efficient administration. It is anticipated that many of these activities will be expanded in scope to provide for the new divisions of membership and the larger opportunities af-

firmed by the federation. The entrance of the new association in the field of aviation service and supply probably will create a new committee and a new division to supervise its activities.

A new schedule of dues will be drawn up for each division of the membership, based on annual gross sales and subdivide it into classifications graded according to volume ranging from under \$500,000 to \$1,500,000 and over. The federation of the two association is expected to result in a reduction of dues for the membership as a whole, spread over three divisions. It is also anticipated there will be a reduction in overhead expense because of administration economies.

Will Have 780 Membership

The immediate net membership, after elimination of duplications, will be approximately 780, with the anticipation of an increase within a short time which may carry the total closer to 1000, due to the greater flexibility of activities which opened up possibilities for new membership from allied basic industries.

The action of the A.E.A. committee in agreeing to the terms as negotiated by the two committees is equivalent to the ratification by that organization because of the plenary powers vested in the committee by the mid-summer convention of the entire membership at Mackinac Island. Formal ratification by the M. & A.M.A. will come through a meeting of the board of directors of that body and the endorsement of their action at a called meeting of the membership.

The following were present as representatives of their organizations: For the Motor & Accessory Manufacturers' Association—President J. M. McComb, M. L. Heminway, M. A. Moynihan, M. B. Ericson, L. A. Safford, W. T. Morris and R. T. McKenna, legal counsel for the M. & A.M.A.

For the Automotive Equipment Association—President A. C. Storz, Vice-President W. C. Hecker, E. R. Seager, W. S. Isherwood, W. E. Wissler, G. B. Shearer, B. W. Ruark and E. H. Casals, legal counsel for the A.E.A.

Propose New Standards

NEW YORK, July 23—The technical committee on the standardization of tool holder shanks and tool post openings has submitted proposals for the standardization of these parts to the sectional committee of the American Engineering Standards Committee and they have been printed and circulated for discussion and criticism. Criticisms are to be mailed to the chairman of the committee, Paul Mueller, engineer, Hartford Machine Screw Co., Hartford, Conn.

Chain Plant at Capacity

COLUMBUS, OHIO, July 23—A. R. Smith, manager of operations of the Columbus plant of the Columbus McKinnon Chain Co., reports the Columbus unit working to full capacity.

Graham-Paige Adds to Plant Capacity

Output Will be Increased to 600 Daily With New Units and Equipment

DETROIT, July 21—On July 18, production of the Graham-Paige Motors Corp. for 1928 reached 43,556 units, passing the total for the entire year 1923, which had stood as the high record for production in the 18 years' history of the factory.

Graham-Paige production so far this year has doubled the entire output for 1927. All old records for output by the day, week, month, and year, have now been surpassed by the new lines of cars introduced this year by the three Graham brothers as the first passenger cars to bear their names.

Improvements and enlargements that will increase the factory capacity from 400 cars to 600 cars a day have been begun to meet the demand brought about by the quick acceptance of the new line by the motoring public. The erection of new buildings and the installation of new equipment, both at its main plant and at the body plant at Wayne, to cost in excess of \$700,000, are now going ahead rapidly. In addition the company has purchased a group of buildings at Fort and McKinstry Streets with a total of 262,000 sq. ft. of floor space, to which will be moved the service and export shipping departments, releasing more space at the Warren Avenue main plant for production.

Will Erect \$1,000,000 Body Plant

EVANSVILLE, IND., July 21—Construction of an automobile body-building plant to cost \$1,000,000 will be started here this week for Motor Bodies, Inc., body-building subsidiary of the Graham-Paige Motors Corp. It was announced that the new body plant will be in operation by Nov. 1, and will employ 1200 men.

Thirteen acres of land have been secured for the site, with additional options for expansion.

The plant will specialize in passenger car body-building. With the completion of the project, it is estimated that one-third of the total Graham-Paige body production will be covered by the local industry. Motor Bodies, Inc., division of Graham-Paige was established here early in the year in the old Karges Wagon Works to build commercial car bodies.

Fire Causes \$80,000 Loss

EVANSVILLE, IND., July 23—Fire Saturday gutted the commercial car body building plant of Motor Bodies, Inc., subsidiary of Graham-Paige Motors Corp. The total loss, according to William E. Allen, general manager, is \$80,000, partly covered by insurance.

Shipments to France Double in Quarter

WASHINGTON, July 26—Imports of American automobiles into France during the first quarter of 1928 were double the imports for the same period of 1927, according to the Department of Commerce.

Six hundred and sixty passenger cars were imported from the United States in this period as against 337 during the 1927 period. Despite high import duties, American trucks are beginning to gain a foothold on the market and the future outlook for the sale of American passenger cars is deemed promising. The registration of motor vehicles in France at the outset of this year showed 636,744 passenger cars; 27,230 cycle cars, 303,531 trucks, 852 gasogene trucks and 233,210 motorcycles.

Twin Coach to Introduce New Type of Street Car

KENT, OHIO, July 21—Employing more than 300 workers and working full time, the Twin Coach Co. has turned out 230 motor buses since the factory started operations here about a year ago. This announcement was made this week by F. R. Fageol, president of the Twin Coach Co. The product represents a value of more than \$2,500,000.

A new type of street car, details of which were not disclosed at the Twin Coach plant, will be introduced at the American Electric Railway Convention in Cleveland in September. The car is a combination street car and bus and runs on rails with the usual trolley. It was learned that the new type car would weigh approximately 16,000 lb. which will mean less than half the weight of the average street car now in use.

Waukesha to Build

MILWAUKEE, July 21—Preparations are under way for the construction of extensive additions to the manufacturing capacity of the Waukesha Motor Co., it is learned. The board of directors has set aside \$600,000 for buildings and equipment, and it is planned to begin work during the late summer so that the new facilities will be ready Jan. 1 or Feb. 1.

Peru Creates Road Fund

WASHINGTON, July 26—Peru intends to spend a total of \$4,300,000 in road building, in the near future, according to an announcement by the Pan American Union. A national loan will provide \$3,500,000 of this amount while \$800,000 will be provided by the governmental budget.

Employment Increase Reported for June

Automotive Centers Show Schedules High With Some Factories on Overtime

WASHINGTON, July 26—A marked increase in employment in the automotive industry and overtime operations in many factories as well as in plants manufacturing automobile accessories was reported for June by the Department of Labor in its survey of industrial employment throughout the country.

The volume of employment generally throughout the country increased considerably during June, although forces employed in several large industries were somewhat curtailed.

Reports from the principal automobile manufacturing centers on employment were as follows:

Michigan: General—In some of the automobile factory centers slight shortages of mechanics and other skilled workers reported. In Detroit, the automobile factories operated on satisfactory schedules with automobile accessory plants reporting overtime.

Flint—Alterations being made in a large plant manufacturing automobile bodies, which will mean employment of a great many additional workers early in September. Lansing—Forces employed in the automobile factories were increased during the month and local employment situation described as satisfactory.

Ohio: General—Overtime operations were reported in automobile factories. Fairly satisfactory operating schedules were reported in the rubber industry but no additional help was employed.

Columbus—Rubber factories operated on curtailed schedule. Toledo—All plants operated, with overtime reported in two automobile factories and a plant manufacturing automobile accessories.

Akron—Employment decreased somewhat in the rubber industry. Alliance—A new airplane plant is being established.

New York: General—Automobile and allied plants operating full time.

New York City—Employment in the automobile accessory and assembling plants satisfactory except for seasonal decrease at end of month.

Buffalo—Automobile industry busy but not quite as active as during May.

Syracuse—Some of the automobile plants and accessory plants working overtime.

Tarrytown—Automobile plants continued busy with full forces employed.

American Metal Builds

MILWAUKEE, July 21—The American Metal Products Co., manufacturer of bearing metals, bushings, metallic packing and tool steels from a copper-aluminum alloy with a high iron content, has completed the erection of an addition, 80 x 100 ft., doubling the capacity of its bronze foundry, and is about to start work on a new rolling mill. The concern reports an increase of sales volume of 50 per cent, compared with the first half of 1927. Carl J. Zaiser is president and general manager.

Cincinnati Business Shows July Increase

Total for June Shows Important Sales Gains in New and Used Cars

CINCINNATI, July 23—Registrations for Hamilton County in June totalled 1883 new and 5572 used cars against 1561 new and 4955 used in the same month a year ago, an increase of 322 and 619, respectively. While the June total was behind May, the big month thus far this year, dealers are highly gratified with conditions and point to the upward trend apparent during the first 15 days of July as indicating that this month will show total sales on a par with or better than June.

For the first 15 days in July 931 new and 2655 used car sales were registered, an increase of 225 and 572 respectively over the same period in 1927. Daily registrations are running an average of less than a car behind June, with every indication that the month's total will exceed last month.

High records were established by many dealers in the medium and low-priced field and an upward trend also was apparent in the higher-priced lines. Packard and Pierce-Arrow, as a result of heavy price reductions, are enjoying a spurt in sales and the effect of the price slash is expected to be reflected in the business throughout the remainder of the summer. Nash, which announced its new models June 21, enjoyed a big business during the remainder of the month and sales have continued high in the early weeks of July.

Massachusetts Shows Gains

BOSTON, July 23—Motor vehicle dealers were gratified at noting from the registration figures of the state motor registry that June showed a substantial increase over the same month a year ago and that the six months figures were encouraging. The increase in June was more than 13 per cent and the six months average was about 6 per cent. Up to July 1 there were 735,624 vehicles registered, comprising 648,916 cars and 86,708 trucks. This is a total increase for the year of 35,938. The increase in cars was 38,487 or 6.3 per cent and in commercial vehicles 1051 or about 1 per cent. Here are the comparative figures:

Six Months to July 1		
	1927	1928
Cars	610,429	648,916
Trucks	85,657	86,708
Total	696,086	735,624

Month of June		
	1927	1928
Cars	40,772	46,652
Trucks	3,327	3,440
Total	44,099	50,092

Lake Boats to Carry 20,000 Cars in 1928

DULUTH, MINN., July 23—This city is becoming a great distributing point for automobiles through operation of two lake carrier lines, which bring the cars up on boats returning light for grain and ore. Last year 9500 automobiles were thus handled and this year the number will be much larger. The new Western Transit Co. has established headquarters with W. S. Jenks of Gladstone, Mich., as vice-president and general traffic manager. W. W. McDonnell is general agent for the Minnesota-Atlantic Transit Co. The two lines are expected to reach 20,000 cars this year for distribution as far northwest as Montana.

Brake Lining Association Finds Brake Improvement

NEW YORK, July 23—Twenty-six states have laws specifying that brakes shall be good, sufficient, adequate, efficient or serviceable, according to findings of the Asbestos Brake Lining Association. Five states define adequate brakes and give stopping distances for both emergency and foot brakes. Twelve states require two sets of brakes, each of which shall be effective to at least two wheels and so constructed that no part which is liable to failure shall be common to the two systems. Five states have no provision whatever for brakes in their motor vehicle laws.

Despite this poor showing, the association finds that cars with defective brakes are decreasing during recent years. Some years ago examination showed that faulty brakes ran from 87 to 92 per cent on cars tested in various campaigns. In 1926 and early 1927 the percentage ran from 50 to 80 per cent, while tests conducted during the latter part of 1927 and early 1928 showed about 10 to 40 per cent of the cars tested, with faulty or defective brakes.

Durant Offers Equipment

NEW YORK, July 21—Durant Motors, Inc., is now equipping model 75 sedans with six wire wheels, six tires and tubes, two spares mounted in fender wells in front and a baggage rack at the rear at a list price of \$165. The mounting charge on this equipment is \$10. These sedans can also be supplied with five wire wheels, tires, tubes and tire cover, the spare being mounted at the rear, at a list price of \$100. Cars of the 65 series are furnished with sport equipment, consisting of five wire wheels and tire cover, the spare being mounted on the rear, at a list price of \$100.

Hart-Parr to Vote on Capital Changes

Company Plans Extension of Plant Facilities—Earnings Increase in 1928

CHICAGO, July 21—A special meeting of stockholders of the Hart-Parr Co. has been called for July 25 at Charles City, Iowa, to vote on the creation of a new class of 60,000 shares of \$6 dividend convertible preferred stock and on increasing the number of common shares to 500,000. The new preferred stock will rank ahead of the class "A" and common stocks as to dividends and assets and the new common capitalization will include shares reserved for conversion of the new convertible preferred, the possible conversion of the class "A" and for the exercise of bond warrants outstanding.

The proceeds of the sale of the major portion of the new preferred and additional common will be used for additional plant facilities, the retirement of \$1,000,000 of first mortgage bonds, redemption of 14,129 shares of 7 per cent cumulative first preferred and the redemption of the class "A" stock. This reconstruction of the capital structure, according to Melvin W. Ellis, president, has been made necessary to provide funds for enlarged operations.

Net profit for the seven months ended May 31 was \$574,900 after charges including interest and Federal taxes, as against \$527,395 in the fiscal year ended Oct. 31, 1927. Net sales for the seven months totaled \$3,249,300 as against \$4,702,900 in the preceding year.

Latest figures on Hart-Parr's outstanding capitalization shows 14,129 shares of 7 per cent cumulative first preferred stock, 26,989 shares of class "A" preferred and 56,114 shares of no par common. Application will be made to list both the new convertible preferred and the common stocks on the Chicago Stock Exchange.

To Manufacture Aircraft

MILWAUKEE, July 21—The Invincible Metal Furniture Co., Manitowoc, Wis., specializing in the manufacture of metal office and bank fixtures, safe deposit boxes, etc., is preparing to engage in the production of all-metal aircraft, it is learned. Contracts have been placed for the erection of a brick and steel building, 86 x 335 ft., adjacent to the present works, for the assembly of aircraft. This will be ready about Aug. 1 or 15. No further details have been divulged.

Date South American Shows

NEW YORK, July 23—The Argentine show will be held Nov. 29 to Dec. 9 in the Pabellon de las Rosas, Buenos Aires, and the annual Montevideo show will be held Nov. 10 to 19 at the Parque Hotel.

Hatfield to Lecture at A.S.S.T. Meeting

Noted British Scientist to Discuss Application of Science to Steel

CLEVELAND, July 23—Dr. W. H. Hatfield, director of the Brown-Firth Research Laboratories, Sheffield, England, will deliver the Campbell Memorial Lecture during the annual convention of the American Society for Steel Treating to be held in Philadelphia the week of Oct. 8 concurrently with the National Metal Exposition.

The subject of Dr. Hatfield's paper will be "The Application of Science to the Steel Industry" and will deal with such topics as steel making problems, manipulation and treatment, special steels, corrosion and acid resisting steels, effect of heat and heat resisting steels and tool steels and cutlery.

Dr. Hatfield is recognized as one of the world's leading metallurgists and has been actively engaged in the steel industry since his graduation from Sheffield University, and has presented over 50 papers before various technical societies as well as being the author of several books on metallurgical subjects.

Dr. Hatfield has been invited to lecture at a number of American institutions after the Philadelphia convention, among which are Yale University, Massachusetts Institute of Technology, Carnegie Institute of Technology, and the University of Michigan. Dr. Hatfield's memorial lecture will be the third since the establishment of the Campbell Memorial Lecture by the A.S.S.T. in honor of its late founder member. The first lecture was presented by Dr. Guertler of Germany, the second by Dr. Jeffries.

Main Rickenbacker Plant Brings \$600,000 at Sale

DETROIT, July 21—The main plant of the Rickenbacker Motor Co., on Cabot St. was sold this week for \$600,000, to James S. Holden, Detroit real estate operator, at a special master's sale. Mr. Holden, as trustee, represented an undisclosed client. He deposited \$25,000 and specified that the property titles should be ready for delivery Aug. 3. Sale of Rickenbacker's factory No. 2 was postponed two weeks. The main plant on Cabot Street occupies a site of approximately 25 acres. Practically all machinery and equipment has been disposed of and the factory is now used for automobile storage.

Heil Company Builds

MILWAUKEE, July 21—The Heil Co., manufacturer of steel dump bodies and tank truck equipment, which recently absorbed its subsidiary, the Hydro-Hoist Co., has started work on the erection of a \$50,000 shop addition,

74 x 302 ft., at its main works, Milwaukee. The addition will benefit all departments, but more especially the hoist division and the department manufacturing stainless steel tank truck bodies for transporting milk, which is far behind on orders. Julius P. Heil is president and general manager.

Crude Rubber Stocks Drop 56,700 Tons in 6 Months

NEW YORK, July 23—World stocks of crude rubber decreased 56,700 tons during the first six months of the year from 263,700 to 207,000 tons, according to F. R. Henderson Corp., which regards this situation as one fraught with danger. The company now places the probable production for the year at 600,000 tons with consumption at 625,000 tons, and believes that present prices are unwarrantedly low on that basis.

Trading last week seemed to be mostly regulatory and rather apathetic. There was a strong buying support that prevented prices from sagging on the apathy of the market but not sufficient to give the market any real life.

George E. Wedin

JAMESTOWN, N. Y., July 21—George E. Wedin, assistant engineer at the Springfield, Ohio, plant of the International Harvester Co., died here July 3 after a six months' illness. He had been connected with the Harvester company since 1919 and was a member of the Society of Automotive Engineers.

Creation of Permanent Motorized Units Seen Developing from Army Experiments

WASHINGTON, July 26—Uncle Sam is now looking forward to the day when doughboys will not hike the roads any longer in going into action but proceed by the more expedient, speedy and efficient motor truck. Experiments with motorized equipment have convinced the War Department observers at Fort Leonard Wood of the necessity of recommending an appropriation of sufficient funds by the approaching Congress to assure eventual creation of a permanent motorized unit, armed with effective modern weapons, as well as transportation units to handle the doughboys, the backbone of the fighting force.

One incident in the experiments stood out like a sore thumb. The observers assembled some 250 machines for the trek between Fort Leonard Wood and Marlboro, Md., a distance of 42 miles. Instead of marching, the infantry was to travel by trucks. Tanks and tractors were to be in line of march. Sanguine observers expected the whole contingent to cover the distance in about five hours, somewhat slower than 10 miles an hour for moving the whole force. The modern equipment of the army acted up to the mark expected. But break-downs in old trucks, relics of

Government Widens Aircraft Standards

International Requirements Provided for to Facilitate Export Trade

WASHINGTON, July 26—Federal standards for licensing aircraft have been modified to bring them within the international "load factor" requirements, according to officials of the engineering section of the aeronautics division of the Department of Commerce.

The requirements for the "approved-type certificates" issued by the Department of Commerce to aircraft designers and manufacturers, which all planes built in the United States must have after Oct. 1, 1928, no longer will be based upon considerations of weight only, but also on the basis of power and loading.

The load-factor requirements, so called, were the result of a recent conference between aeronautic engineers of the department and engineers representing airplane manufacturers. It is expected that modification of the previous requirements will facilitate exportation of planes, since it brings planes manufactured in the United States much further into the standardized classes appertaining in most other countries.

World War days, antiquated and otherwise out-of-date, caused the tail end of the procession to string in nine hours after starting time.

In the face of this discouraging fact, however, army men derived deep satisfaction from the knowledge that under forced marches, infantry afoot would have taken two days.

Reports are general in this city that figures contained in the preliminary estimates for the 1930 fiscal year, although still confidential, are making far greater allowances for motorization of the army than ever before, and it is expected that the budget director will be asked to double the appropriation for machine weapons such as the tank over the 1929 figures. The rumor is current in high circles here that the army is looking forward to the development of a motorized unit of at least 3000 men by 1934, being self-sustaining and independently operating, with a group of light tanks, several armored cars, a large quantity of strong, fast trucks, and motorized anti-aircraft, signal and supply trains in the entourage.

These seem to be the unofficial headlights of the experimental results at Camp Leonard Wood with motorized equipment.

Bay State to Levy New Automobile Tax

BOSTON, July 21—Again Massachusetts has found a way to give the thumbscrew of taxation on motorists another turn downwards through the enactment of a law whereby motor vehicles are taken out of the property class and placed in another class whereby an excise tax may be levied upon the owners. This marks the end of a fight of several years by the tax assessors' association.

Under the Massachusetts law any person who did not own a motor vehicle on April 1 did not have to pay a property tax. That led to thousands of cars being held for delivery until April 2 each year. Now no matter when delivery is made, the owner must pay an excise tax under the guise that it is fee for the use of the roads. If a vehicle is bought after July 1 the tax is 50 per cent of the total, and after Oct. 1, 25 per cent. It is assessed against the owner when the car is first registered each year.

Builds 1000 Bodies Daily

PONTIAC, July 21—The Pontiac division of Fisher Body Corp., has maintained an output of 1000 daily for the last three months, according to Henry P. Blow, manager. The division has enough orders on hand to insure a continuance of the record output for at least two months more. This division makes bodies for the Oakland and Pontiac automobiles.

N.S.P.A. Adds Members

DETROIT, July 21—Directors of the National Standard Parts Association elected in July the following manufacturers to membership:

Apco Mossberg Corp., Attleboro, Mass., and Kraeuter & Co., Newark, N. J. Thirteen jobber members were elected.

Coming Feature Issue of Chilton Class Jour- nal Publications

Oct. 10—Marketing Annual for
1929—Motor World Whole-
sale.

Disk Patent Rehearing Sought by Motor Wheel

DETROIT, July 21—The United States Circuit Court of Appeals at Cincinnati has rendered a decision affirming the verdict of Judge Arthur J. Tuttle holding valid the Hoffman disk wheel patent No. 1353161, declaring it to be infringed by the Motor Wheel Corp. of Lansing in the construction of its Tuarc wheel. The Hoffman patent relates to the reinforcement of the main disk through supplemental disks arranged adjacent to the hub. Roscoe B. Hoffman, the inventor, is a well-known automotive engineer, having served in an engineering capacity for a number of leading producers.

Motor Wheel Corp. has filed a petition with the circuit court of appeals for a rehearing of the case. According to C. C. Carlton, secretary of Motor Wheel Corp., the feature covered by the Hoffman patent has not been used in the construction of wheels by Motor Wheel since 1926.

Mono to Add Hangar

MOLINE, July 21—A concrete hangar, 60x100 ft., the second to be erected, will be built by the Mono Aircraft Corp. at the Moline airport as an assembly and storage plane for the firm which is producing Monocoupe at the rate of four and a half a day. The first hangar, completed only a few weeks ago, has already been outgrown because of the increase in the Mono aircraft business.

Rail-Plane Service to Start August 15

CHICAGO, July 23—Chicago will be the southern terminus of the first air-rail passenger service to be established, it was announced this week in New York by Col. Paul Henderson of Chicago, who named Aug. 15 as the tentative date on the first trip. The service is to be inaugurated by the Transcontinental Air Transport, Inc., of which Mr. Henderson is vice-president and general manager.

The arrangement will connect the East and the Northwest, with Chicago as the pivot city and Minneapolis as the northern terminus. Passengers arriving in Chicago from the East will depart soon afterward by plane for Minneapolis where connections can be made with Northern rail systems. The service has been arranged by the air concern and the Pennsylvania, Great Northern, and Chicago, Milwaukee, St. Paul and Pacific railroads.

National Gauge to Expand

LACROSSE, WIS., July 21—P. M. Gelatt, president of the National Gauge & Equipment Co., division of the Moto Meter Corp., has gone to New York to attend a conference at the general offices with respect to the proposed enlargement of the LaCrosse division. When the Moto Meter Corp. took over the National company about a year ago, work was immediately begun on the erection of a large factory addition. Now additional manufacturing space is again needed.

Modine to Add Units

RACINE, WIS., July 21—The Modine Mfg. Co. expects to be ready to break ground Aug. 15 for the construction of shop additions costing \$100,000. Plans are now being prepared. A. B. Modine is president and general manager.

Calendar of Coming Events

SHOWS

American Electric Railway Ass'n, Public Auditorium, Cleveland	Sept. 22-23
American Road Builders Association, Inc., Cleveland Auditorium	Jan. 14-19
American Society for Steel Treating, Commercial Museum, Philadelphia	Oct. 8-12
American Welding Society, Commercial Museum, Philadelphia	Oct. 8-12
Automotive Equipment Association, Coliseum, Chicago	Oct. 22-27
Berlin	Nov. 8-18
Brussels	Dec. 8-19
Buenos Aires	Nov. 29-Dec. 9
*Chicago, National, Coliseum, Jan. 26-Feb. 2	
Leipzig	Aug. 26-Sept. 1
London, passenger cars	Oct. 11-20
Montevideo	Nov. 10-19
National Standard Parts Association, Cleveland Auditorium	Oct. 29-Nov. 3
*New York, National, Grand Central Palace	Jan. 5-12
Paris, passenger cars	Oct. 4-14
Paris, trucks	Nov. 15-25
Prague	Sept. 1-9
Salon, Automobile Salon, Inc., Hotel Drake, Chicago	Jan. 26-Feb. 2
Salon, Automobile Salon, Inc., Hotel Biltmore, Los Angeles	Feb. 9-16

*Will have special shop equipment exhibit.

Salon, Automobile Salon, Inc., Hotel Commodore, New York	Dec. 2-8
Salon, Automobile Salon, Inc., Palace Hotel, San Francisco	Feb. 23-Mar. 2
Toronto, Can.	Aug. 24-Sept. 8

CONVENTIONS

American Electric Railway Ass'n, Public Auditorium, Cleveland	Sept. 22-23
American Gear Manufacturers Association, Statler Hotel, Buffalo, N. Y.	Oct. 11-13
American Institute of Mining and Metallurgical Engineering, Benjamin Franklin Hotel	Oct. 8-12
American Road Builders Ass'n, Inc., Cleveland Auditorium	Jan. 14-19
American Society for Steel Treating, Commercial Museum, Philadelphia	Oct. 8-12
American Welding Society, Commercial Museum, Philadelphia	Oct. 8-12
Automotive Equipment Association, Coliseum, Chicago	Oct. 22-27
National Highway Congress, Mexico City	Oct. 3-6
National Safety Council, National Congress, New York	Oct. 1-5
National Standard Parts Association, Hollenden Hotel, Cleveland	Oct. 29-Nov. 3

Society of Industrial Engineers, Rochester, N. Y.	Oct. 17-19
World Motor Transport Congress, Rome	Sept. 25-29

A. S. M. E.

Cincinnati, Oct. 22-25	Machine Shop Practice
Cleveland, Sept. 17-20	Fuels

S. A. E. National

Chicago, Dec. 6-7	Aeronautic
Detroit, Book-Cadillac, Nov. 22-23	Production
Detroit, Book-Cadillac, Jan. 15-18	Annual
Los Angeles, Sept. 13-14	Aeronautic
Newark, Robert Treat Hotel, Oct. 16-18	Transportation
New York, Hotel Astor, Jan. 10	Annual Dinner

RACES

Altoona	Aug. 18
Belgium	Aug. 12
Great Britain	Sept. 22
Italy	Sept. 2
Salem	Oct. 12
Syracuse	Sept. 1